

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—January, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

JANUARY 7TH, 1885.—The Society met at 8 p. m., Vice-President William H. Paine in the chair; John Bogart, Secretary. Ballots for membership were canvassed, and the following named candidates declared elected: As Members: Peter Sather Archibald, Moncton, New Brunswick; Charles Sumner Henning, Peach Springs, Arizona; Charles Maples Jarvis, East Berlin, Conn.; Henry W. B. Phinney, New York. As Juniors: William Ferris Booth, Poughkeepsie, N. Y.; Edward Flad, St. Louis, Mo.; Sinclair Joseph Johnson, New York.

The vote on the following proposed amendment to the By-Laws was canvassed:

[The Amendment is in italics.]

SECTION 19.—A nomination or proposal shall be presented at the next regular meeting of the Board of Direction following its receipt; *the Board of Direction shall thereupon send to all members of the Society a notice that such person is a candidate for election. Not less than thirty days thereafter the Board shall consider the application, and if approved and the applicant (if for admission as Member, Associate or Junior) classed with his consent, a day shall be fixed for the ballot to be canvassed, which shall be at a regular meeting of the Society, not less than twenty-five days thereafter.*

The vote was yeas, 177; nays, 7. This amendment to the By-Laws, having been proposed in writing and seconded at a regular meeting, then submitted to vote of the members by letter ballot, and having received two-thirds of all the votes cast, was declared adopted.

The Secretary reported the presentation to the Society by Mr. James B. Francis, Past-President Am. Soc. C. E., of 66 bound volumes of the *Annales des Ponts et Chaussées*, being complete from the year 1831 to 1862, inclusive. A paper by Professor R. H. Thurston, M. Am. Soc. C. E. on "The Real Value of Lubricants, and the Correct Method of Comparing Prices," was read.

Mr. M. Eisler, C. E., exhibited specimens of rock from the Isthmus of Panama, and gave some descriptions of the geology and topography of the Isthmus.

Mr. H. C. V. Moller, C. E., Assistant City Engineer of Copenhagen, Denmark, exhibited maps of the harbor of Copenhagen, and described the Harbor Works.

THE ANNUAL MEETING, JANUARY 21, 1885.

The meeting was called to order at 10 o'clock by Mr. John Bogart, Secretary of the Society, who read a telegram from Mr. D. J. Whittemore, President of the Society, as follows: "Sickness forces my absence. Remember me in kindness to all present." The chair was then taken by Vice-President William H. Paine.

Messrs. George H. Bishop, Charles E. Goad and David E. McComb, members of the Society, were appointed tellers to canvass the ballot for officers.

The annual report of the Board of Direction* was then read by the Secretary, and, on motion, accepted.

The annual report of the Treasurer* was then read by Mr. J. J. R. Croes, Treasurer of the Society, and, on motion, accepted.

The report of the Finance Committee* was read and accepted.

The report of the Board of Censors to award the Norman Medal, was read and accepted. It is as follows:

AMERICAN SOCIETY OF CIVIL ENGINEERS, }
127 EAST TWENTY-THIRD STREET, }
NEW YORK, January 20, 1885. }

To the American Society of Civil Engineers:

Gentlemen: The undersigned having carefully examined the original papers presented to the Society during the year ending August, 1884, select paper No. CCLXXIX, by James Christie, M. Am. Soc. C. E., entitled: "Experiments on the Strength of Wrought-Iron Struts," as worthy of special commendation for its merits as a contribution to engineering science, and hereby award to it the Norman Medal on the grounds prescribed in the rules governing such award.

LEBBEUS B. WARD,
EDGAR B. VAN WINKLE,
AMORY COFFIN,

Censors to Award the Norman Medal.

*Printed separately.

The report of the committee appointed to award the Rowland Prize, was presented, and accepted. It is as follows :

AMERICAN SOCIETY OF CIVIL ENGINEERS, }
127 EAST TWENTY-THIRD STREET,
NEW YORK, January 15TH, 1885. }

To the American Society of Civil Engineers :

Gentlemen : The committee appointed to award the Rowland Prize, for the year terminating on the first day of August, 1884, reports that, in its judgment, the prize should be awarded to Paper No. CCLXXXIV., "Water Power with High Pressures, and Wrought-Iron Water Pipe," by Hamilton Smith, Jr., M. Am. Soc. C. E.

Respectfully submitted,

GEO. S. MORISON,
D. FARRAND HENRY,
JOHN BOGART,

Committee.

The following proposed amendment to the Constitution, which had been regularly submitted and sent by letter to the Members of the Society, was then read and discussed :

PROPOSED AMENDMENT TO ARTICLE XXII.

Add at end of Article as follows :

Any member of the Society, not in arrears for dues, may compound for future annual dues by the payment of Two Hundred and Fifty Dollars.

Provided, however, that each person duly elected a member shall pay the entrance fee and also the annual dues for the current year of his election.

Provided, also, that any Member desiring to compound for future annual dues shall have paid the annual dues for the current year before the compounding sum may be available.

Provided, also, that in addition to the sum provided for compounding dues, there shall be paid by each compounding member, resident within fifty miles of the Post Office in the City of New York, the sum of Ten Dollars per year for five years after compounding.

Should a resident member become non-resident at any time during the five years after compounding, he shall be relieved from the payment of such annual sum during the time of non-residence.

Should a non-resident member become resident at any time within five years after compounding, he shall be liable to the annual payment of Ten Dollars for each year of residence up to five years after compounding.

Members compounding shall sign an agreement that they will be governed by the Constitution and By-Laws of the Society as they are now formed, or as they may be hereafter altered, amended or enlarged; and that in case of their ceasing to be members from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.

The above amendment was proposed by the following named members of the Society: William P. Shinn, Chas. E. Emery, Edward P. North, Wm. G. Hamilton, and H. D. Blunden.

Captain W. H. Bixby, M. Am. Soc. C. E., by letter, objected to the amendment as it stands, because he considered (1) that the object of compounding is the avoidance of all future annual dues and of all future laws; and (2), that if compounding members are to be governed by future changes in the Constitution, the very object of compounding is defeated.

To this a member replied that the compounding was expressly stated to be for all future annual dues, and that it would be a contract with the Society which would prevent the imposition at any time of future dues. Letters were read from several members favoring the proposed amendment. In reply to an inquiry, the Proceedings of the Annual Meeting, January 17, 1883 (Proceedings for January, 1883), in reference to this question, were read, from which it appeared that this amendment, in the same words as now offered, was at that time recommended by vote of the Annual Meeting for adoption by the Society; but on account of the provisions then existing as to the method of voting upon the amendment to the Constitution, the amendment as it had been originally offered, and also as amended by the Annual Meeting to this present form, were both voted upon, and the favorable vote was divided between the two, neither having sufficient votes; but the vote for the two combined being enough to adopt.

Mr. A. M. Wellington, M. Am. Soc. C. E., suggested that the amendment in its present form was inequitable as between resident and non-resident members; that while the dues of \$15 per year, are common to all members, the resident member pays an additional due of \$10 per year while so resident. The proposed compounding sum of \$250 is for the general dues of \$15 per year, but the proposed additional sum of \$10 per year for only 5 years, or in other words \$50 additional, is not a sufficient sum under the circumstances.

After discussion, the whole subject was referred to a committee, with a request that the committee draft a suitable amendment in accordance with the suggestions in discussion, and report the same to this meeting. Messrs. A. M. Wellington, William P. Shinn and Theodore Cooper, were appointed such committee.

The committee subsequently reported and recommended for adoption the following modified form of amendment:

PROPOSED AMENDMENT TO ARTICLE XXII.

Add at end of Article as follows:

Any member of the Society not in arrears for dues, may compound for the payment of all future annual dues, except as hereinafter provided, by the payment of two hundred and fifty dollars.

Provided : That all Resident Members, or those who may hereafter become such, shall be and remain liable to the annual payment of the difference between the annual dues of Resident and Non-resident Members, as the same now is or may be established from time to time ; but any member may at any time compound for the future payment of all Annual Dues of every nature and kind, by the payment of seventy-five dollars, in addition to the two hundred and fifty dollars hereinbefore provided for.

Provided, however, that each person duly elected a Member shall pay the entrance fee and also the annual dues for the current year of his election.

Provided, also, that any Member desiring to compound for future annual dues shall have paid the annual dues for the current year before the compounding sum may be available.

Members compounding shall sign an agreement that they will be governed by the Constitution and By-Laws of the Society as they are now formed or as they may hereafter be altered, amended or enlarged ; and that in case of their ceasing to be members from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.

All moneys thus paid in commutation of annual dues shall be invested as a permanent fund ; the interest thereof, only, being subject to appropriation for current expenses.

On motion, the report of the Committee was accepted, and the revised amendment, as reported, was adopted as an amendment of the original proposition.

The proposed amendment as adopted, was then, by vote of the Annual Meeting, recommended to the Society for adoption.

The tellers to canvass the ballot for Officers, presented their report, as follows :

Total number of ballots received.....	232
Deduct without endorsement of member.....	3
Duplicated ballot.....	1
Envelopes containing no ballot.....	2
	— 6
Total vote.....	226

For President : Mr. Frederic Graff, received 222 votes ; scattering, 4. For Vice-President, Mr. George S. Greene, Jr., received 224 ; Mr. Thomas J. Whitman, 222 ; scattering, 5. For Secretary and Librarian : Mr. John Bogart received 224 ; scattering, 1. For Treasurer : Mr. J. James R. Croes received 224 ; scattering, 2. For Directors : Mr. Theodore Cooper received 225 ; Mr. William R. Hutton, 224 ; Mr. Walter Katté, 222 ; Mr. O. Chanute, 221 ; Mr. F. W. Vaughan, 221, scattering, 16.

The following members were thereupon declared elected Officers of the Society for the ensuing year :

President : FREDERIC GRAFF.

Vice-Presidents : GEORGE S. GREENE, JR.; THOMAS J. WHITMAN.

Secretary and Librarian : JOHN BOGART.

Treasurer : J. JAMES R. CROES.

Directors : THEODORE COOPER, WILLIAM R. HUTTON, WALTER KATTE, O. CHANUTE, F. W. VAUGHAN.

The Vice-President introduced Mr. Frederic Graff, President-elect, to the Annual Meeting. Mr. Graff spoke as follows :

"I assure you, gentlemen, I feel totally unable to express in appropriate terms my heartfelt thanks to the Members of the Society here present, and those who, although absent, have, by their votes, joined in according to me the distinguished honor of addressing you as the President of the American Society of Civil Engineers, a title which conveys an idea of the vast extent over which its influence is felt, and through which the work of its members is known.

The position conferred upon me is as unexpected as it is in the highest degree gratifying.

All who have made themselves familiar with the great benefits bestowed by the work of the Society upon the public and the engineering fraternity, recognize the importance and usefulness of such an association as ours.

Its members individually fully appreciate the great advantages afforded for acquaintance with their fellows, and the opportunities given them to freely communicate the successes and failures by which so much is sometimes learned.

It affords me much pleasure to be able to say that I have enjoyed the personal friendship of all my predecessors, with the exception of three, and in recognizing their great ability as engineers, and peculiar fitness for the office which I am about to assume, I cannot but be sensible of the responsibility, and can only hope in an imperfect manner to worthily follow such distinguished and valued leaders.

My endeavor shall be, as far as in my power, to perform the duties of the office for the best advantage and advancement of the Society, and its objects.

I feel, gentlemen, that to do this with any possibility of success, I must earnestly ask your co-operation, and that of your well-tried and experienced officers, in the work, which I hope with such aid to perform in a manner worthy of its importance.

Hoping that the advance and success of the Society in 1885 shall be at least as great, if not greater, than that of previous years, I again cordially thank you for the honor bestowed upon me."

The Secretary then announced the death, on January 12, 1885, of Mr. John B. Jervis, Hon. M. and F. Am. Soc. C. E. At the request of the Chairman, remarks were made by Messrs. William P. Shinn and A. M. Wellington.

Mr. WM. P. SHINN, M. Am. Soc. C. E.—Mr. President and Gentlemen: As probably the member of the Society whose intercourse with Mr. Jervis has been most intimate during his later years, I will state that my acquaintance with Mr. Jervis dates back some twenty-four years, to the time when he assumed the position of General Superintendent of the Pittsburgh, Fort Wayne and Chicago Railway. Since that time I have enjoyed—and I use that word in its broadest sense—I have enjoyed the acquaintance of Mr. Jervis as that of no other man.

Professionally you all know him by his work, particularly the work of his middle life—the Croton Aqueduct. But he was a man whom to fully appreciate it was necessary to enjoy personal relations with, such as fall to the lot of but few; a man who joined professional ability with private virtues to a greater extent than any other whom it has been my fortune to know; a man whose remarkable experience it was to emerge from the swamps of Oneida County with an axe in his hand to clear the way for the engineers who were locating the Erie Canal, and to end his professional labors in connection with that canal as the engineer in charge of fifty miles of the work, and that of the most responsible part of the work, the eastern end.

When he was called to the Croton Aqueduct the science of hydraulic engineering was almost without an example in this country. He did that work in the midst of a flood of hostile criticism, such as probably no member of the Society here present has ever encountered. The work, like most public works, was opposed by various parties; some as political partisans; some as taxpayers, who objected to the wasteful expenditure (as they considered it) of their money; and some, I regret to say, as representatives of our profession, one of whom in a communication over his own signature within six months of the completion of the aqueduct boldly predicted that it would never bring a drop of water to the city of New York.

Of Mr. Jervis' later works, most of us know his connection with the Hudson River Railroad, which was also very severely criticized as a work that could not possibly be accomplished, and that when accomplished could not possibly pay; with the Michigan Southern and Northern Indiana Railroad, the Chicago and Rock Island and the Pittsburgh, Fort Wayne and Chicago, with the building of which he had nothing to do, but which he rebuilt. But perhaps the most extraordinary event in connection with his remarkable life was his being called in consultation by the engineers in charge of the new Croton Aqueduct plans, at the age of 86, to confer with them in regard to their plans, over which he spent some weeks and made a very elaborate report, probably his last

professional work. I had the pleasure of spending a day with him in the month of November last. I found his intellect apparently as vigorous as ever, although his frame was feeble. He looked forward to the winter with little expectation of getting through it, although his talk of the future was cheerful, as his life had always been. His death, when it came, was the result of a combination of circumstances such as might very easily have overborne one possessed of more strength than he at the age of eighty-nine. The treasurer of the Rome Merchant Iron Mill, with whom he had a personal conference on a day about three weeks prior to his death, walked over from the mill to the city in the afternoon and dropped dead while in the act of opening a telegram. The intelligence of his death was indiscreetly telephoned to Mr. Jervis' house, which caused him a sleepless night. He felt that he must go to the mill the next day, for even at his advanced age he was in the habit of going to the mill every day when the weather and his health would permit. He was taken with a nervous attack while at the mill. He returned to his house and went to the bed, from which he rose but once after that time. He might have recovered from that shock; but about a week or ten days later he received the intelligence of the death of his only sister, a lady past eighty, and that came without any knowledge of her previous illness. I spoke of his leaving his bed once; it was to execute a deed for an interest left to him in the estate of that sister which he desired to go to a female relative; so that it may well be said that he died in the discharge of what he felt to be his duty. His intellect remained unclouded until within about a day of his death.

Mr. A. M. WELLINGTON, M. Am. Soc. C. E.—I move that a committee be appointed to prepare a memoir of Mr. Jervis for the Proceedings of the Society, and in doing so it may perhaps be appropriate to call the attention of the members to one little fact in Mr. Jervis' life which Mr. Shinn did not especially allude to, but which has always seemed to me perhaps the most striking proof of engineering foresight and genius which he ever gave, and that was that a little over two years before the trial of the Rocket, which we are accustomed to regard as the first appearance of the modern locomotive as a perfected and workable device, Mr. Jervis, who at that time had only been a very few years an engineer, had sufficient foresight and courage to send to England to order a locomotive for trial. His assistant, Horatio Allen, was sent to England, and brought back three locomotives, one of which was successfully tried in this country two years before the trial of the Rocket, having been run by Horatio Allen himself. When we consider how much farther England was from this country then than it is to-day, how scant was the supply of capital for doubtful experiments, how little experience any one had in the construction of great public works, and how little a time Mr. Jervis himself had been an engineer, I think that

that was about as great evidence of courage and foresight as any engineer has ever given.

The motion was carried and the President was authorized to appoint a committee to prepare a memoir of Mr. Jervis for publication.

The time and place for the next Convention were then considered. The Secretary read the following circulars, which had been issued to the Society upon this subject :

GENERAL SUGGESTIONS IN REFERENCE TO CONVENTIONS.

Communication to Members from the Board of Direction.

In view of the fact that a number of members of the Society have expressed the opinion that our Conventions have not been giving satisfactory results, and particularly that the number of days to which they are necessarily limited does not give sufficient time for all that has been attempted ; and in view also of the fact that the Board has been particularly requested to consider whether some modifications might not be properly made in the conduct of the Conventions, the following considerations are presented by the Board to our members.

These considerations are in harmony with a report prepared by a committee of members of the Society appointed to consider the subject.

It has been evident to those who have attended the Conventions of the last few years that some modification should be made, if the best results, which are believed to be practicable, are to be hereafter secured.

Some of the undesirable features are :

(1.) The entirely too limited time given to the presentation and discussion of professional papers.

(2.) The entirely too large amount of time taken up in local excursions and visits by the whole body of the Convention to points and objects which are not really of general interest.

(3.) The feeling of obligation which arises from the fact that members, resident at the place of the Convention, have raised large sums of money through contributions from themselves, and from other persons generally interested in engineering or desiring that the Society should enjoy its visit ; and, in this connection the feeling that the money must be spent in providing the excursions alluded to, and in furnishing entertainments which are of a more elaborate character than is requisite for the entire enjoyment of the members and visitors.

All of these considerations are interdependent ; they have arisen from no special fault on the part of any who have been active in promoting past conventions ; but the feeling that a change ought to be made certainly exists, and certainly should be considered.

It is suggested that an entirely new method of holding our Conven-

tions may be tried with sufficient promise of success to warrant the experiment, and this new method, in general terms, may be :

To hold a Convention not at any large city, nor upon the invitation of local members ; but to secure, if possible, a place where all can be accommodated in a proper way, and where the Convention can be arranged and managed entirely with reference to the best assurance of carrying out the objects which make it desirable that Conventions should be held. It is suggested that these objects are:

(a.) The presentation, consideration, and undisturbed discussion of professional subjects.

(b.) The opportunity for free intercourse between members of the Society gathering at our Conventions from all parts of the United States, and in fact of the world.

(c.) Such opportunities for social recreation as may not interfere, but rather aid in the other two objects mentioned above.

It is suggested that the Convention can be held at some large hotel, preferably not in a city. Those who were present at the St. Paul and Minneapolis Convention of last year will remember the Hotel Lafayette, at Lake Minnetonka. There are other hotels in other parts of the country fully as large, and located, many of them, in delightful situations. Doubtless, a committee of the Board of Direction can find such a location, and can secure ample accommodations on reasonable terms, where all the requisites for comfortable meetings can be had, where the opportunity will be afforded for pleasant intercourse, and where no calls will be made upon the members which will interfere either with the professional or social enjoyment of the occasion.

Some of our members who have discussed this subject have already made inquiries and have found several such places. With proper arrangements, the meetings of the Society during the Convention, held in such a hotel, would give ample time for entirely free and uninterrupted discussion. The classification of papers and subjects, as suggested in a circular accompanying this, could be made to add largely to the interest of discussions. The hours not devoted to meetings would give excellent opportunities for the more intimate acquaintance of our members with each other. Every provision could be made for the comfort of the members and their families without interfering with the other objects of the Convention.

It is suggested that the experiment be tried, and that the Board of Direction be authorized to secure such provisions for the next Convention as have been outlined above.

The Board asks for this subject the earnest consideration which its great importance to the welfare of the Society demands.

A blank form for the return of the views of members is sent herewith, and it is particularly requested that these be filled out and forwarded to the Secretary. The replies will be reported to the Annual Meeting, when the subject will be considered.

THE PRESENTATION, READING AND DISCUSSION OF PAPERS AT
CONVENTIONS.

THE FOLLOWING PROPOSED REGULATIONS WILL BE SUBMITTED BY THE BOARD OF DIRECTION AT THE ANNUAL MEETING, JANUARY 21ST, 1885.

Members of the Society to be informed that papers submitted for reading at any Annual Convention should be in the hands of the Secretary at least 40 days before the date of such Convention.

Members also to be informed that papers which are not received in time to conform to this rule can only take the chance of being presented to the Convention after the reading and discussion of the papers which have been so submitted.

When papers are received in accordance with this regulation, and have been accepted by the Committee for presentation, the Secretary to have concise abstracts made of each paper, and to mail these abstracts to each member of the Society, with a request that discussion be prepared, and also that each member who is willing and desirous to take part in the discussion shall so inform the Secretary. More detailed information as to a particular paper may be furnished to members desiring to discuss it.

In preparing the programme for the Convention, the papers to be classified, so that as far as practicable definite classes of subjects may be considered at the same time; and notices of this classification, and of the times when particular subjects are to be considered, to be prepared and posted. The discussions upon particular subjects and papers to be opened by members, in an order to be designated by the Chairman of the Convention, and afterwards the discussion to be general.

A Committee, to be appointed by the Board, of members who are to be present at the Convention, which Committee will aid the Secretary in arrangements for the presentation and discussion of papers, and in perfecting other requisite details for the Convention.

An abstract of the suggestions made by members upon this subject was then read:

Total number of replies received.....	183
Suggesting that the Board of Direction be authorized to secure the provisions for next Convention, as outlined in the circular.....	136
Suggesting that visiting and inspection of engineering works be not omitted.....	13
That the method adopted in the past be continued.....	2
Communications agreeing in general with the views of the circular, but offering suggestions as to special points.....	32
	<hr/> 183

tions may be tried with sufficient promise of success to warrant the experiment, and this new method, in general terms, may be :

To hold a Convention not at any large city, nor upon the invitation of local members ; but to secure, if possible, a place where all can be accommodated in a proper way, and where the Convention can be arranged and managed entirely with reference to the best assurance of carrying out the objects which make it desirable that Conventions should be held. It is suggested that these objects are:

(a.) The presentation, consideration, and undisturbed discussion of professional subjects.

(b.) The opportunity for free intercourse between members of the Society gathering at our Conventions from all parts of the United States, and in fact of the world.

(c.) Such opportunities for social recreation as may not interfere, but rather aid in the other two objects mentioned above.

It is suggested that the Convention can be held at some large hotel, preferably not in a city. Those who were present at the St. Paul and Minneapolis Convention of last year will remember the Hotel Lafayette, at Lake Minnetonka. There are other hotels in other parts of the country fully as large, and located, many of them, in delightful situations. Doubtless, a committee of the Board of Direction can find such a location, and can secure ample accommodations on reasonable terms, where all the requisites for comfortable meetings can be had, where the opportunity will be afforded for pleasant intercourse, and where no calls will be made upon the members which will interfere either with the professional or social enjoyment of the occasion.

Some of our members who have discussed this subject have already made inquiries and have found several such places. With proper arrangements, the meetings of the Society during the Convention, held in such a hotel, would give ample time for entirely free and uninterrupted discussion. The classification of papers and subjects, as suggested in a circular accompanying this, could be made to add largely to the interest of discussions. The hours not devoted to meetings would give excellent opportunities for the more intimate acquaintance of our members with each other. Every provision could be made for the comfort of the members and their families without interfering with the other objects of the Convention.

It is suggested that the experiment be tried, and that the Board of Direction be authorized to secure such provisions for the next Convention as have been outlined above.

The Board asks for this subject the earnest consideration which its great importance to the welfare of the Society demands.

A blank form for the return of the views of members is sent herewith, and it is particularly requested that these be filled out and forwarded to the Secretary. The replies will be reported to the Annual Meeting, when the subject will be considered.

THE PRESENTATION, READING AND DISCUSSION OF PAPERS AT
CONVENTIONS.

THE FOLLOWING PROPOSED REGULATIONS WILL BE SUBMITTED BY THE BOARD OF DIRECTION AT THE ANNUAL MEETING, JANUARY 21ST, 1885.

Members of the Society to be informed that papers submitted for reading at any Annual Convention should be in the hands of the Secretary at least 40 days before the date of such Convention.

Members also to be informed that papers which are not received in time to conform to this rule can only take the chance of being presented to the Convention after the reading and discussion of the papers which have been so submitted.

When papers are received in accordance with this regulation, and have been accepted by the Committee for presentation, the Secretary to have concise abstracts made of each paper, and to mail these abstracts to each member of the Society, with a request that discussion be prepared, and also that each member who is willing and desirous to take part in the discussion shall so inform the Secretary. More detailed information as to a particular paper may be furnished to members desiring to discuss it.

In preparing the programme for the Convention, the papers to be classified, so that as far as practicable definite classes of subjects may be considered at the same time; and notices of this classification, and of the times when particular subjects are to be considered, to be prepared and posted. The discussions upon particular subjects and papers to be opened by members, in an order to be designated by the Chairman of the Convention, and afterwards the discussion to be general.

A Committee, to be appointed by the Board, of members who are to be present at the Convention, which Committee will aid the Secretary in arrangements for the presentation and discussion of papers, and in perfecting other requisite details for the Convention.

An abstract of the suggestions made by members upon this subject was then read:

Total number of replies received.....	183
Suggesting that the Board of Direction be authorized to secure the provisions for next Convention, as outlined in the circular.....	136
Suggesting that visiting and inspection of engineering works be not omitted.....	13
That the method adopted in the past be continued.....	2
Communications agreeing in general with the views of the circular, but offering suggestions as to special points.....	32

183

The following places were also suggested in these replies: Ashland, Wis.; Baltimore, Md.; Catskill, N. Y.; Hotel Kaaterskill and Grand Hotel, Catskill, N. Y.; Chataqua Lake; Chicago; Cincinnati; Hotel Lafayette, Minnetonka, Wis.; Cornell University, Ithaca, N.Y.; New Orleans; Richland Springs; San Francisco; Saratoga; White Mountains; White Sulphur Springs; the line of the Pennsylvania Railroad.

The White Sulphur Springs was also suggested by some members present at the meeting.

Mr. S. B. Opdyke, Jr., M. Am. Soc. C. E., said that as, in conversation before the Annual Meeting, Saratoga had been suggested as a possible location for the next Convention, he had taken pains to inquire as to the probable facilities for reaching Saratoga by the various lines of railway, and that he had secured from the officers of a number of lines the statement that they would be very glad to offer the Society special facilities for travel over their lines, should Saratoga be selected for the place of the Convention. This included a trip to the Hoosac Tunnel.

Mr. A. W. Locke, M. Am. Soc. C. E., the manager of the Troy and Greenfield Railroad and Hoosac Tunnel, confirmed this statement, and said that he had received the assurance that the Society would be welcomed and taken care of on the lines approaching Saratoga and the Tunnel, from the eastward.

After discussion the subject of the time and place for the next convention of the Society was referred, with power, to the Board of Direction, with the request that the Board give full consideration to the suggestion of holding the meeting at Saratoga.

The following letter was then presented:

THE AMERICAN EXHIBITION IN LONDON, 1886. }
CITY OFFICES: 7 POULTRY, LONDON, E. C., }
5 JANUARY, 1885.

D. J. WHITTEMORE, Esq., *President,*

The American Society of Civil Engineers, New York.

Dear Sir,—As the representative of the Executive Council of the American Exhibition to be held in London in 1886, it affords me exceeding pleasure on their behalf to invite the American Society of Civil Engineers to hold their annual convention in London in 1886.

We shall be delighted to provide the members with rooms for their meetings, and to do all in our power to promote their pleasure and comfort.

Negotiations have already been entered into with Atlantic Steamship lines, by which a material saving in the usual passenger rates will be effected, and such of the members of your Society as shall honor us by accepting our invitation, will, of course, have every communication afforded them, so that they may profit by the favorable terms we are certain to obtain.

In the hope that this invitation will be favorably received and accepted.

I am, dear sir, yours respectfully and faithfully,

JOHN R. WHITLEY,

Director General.

On motion, the thanks of the Society were tendered to the Executive Council of the American Exhibition, to be held in London in 1886, for this courteous invitation, and the Secretary was requested to transmit this action of the Society to the proper officers of that exhibition.

A recess was then taken for lunch, which was served in the Society House.

After lunch the session was resumed.

The report of the Committee on Uniform Standard Time was presented.

REPORT OF THE SPECIAL COMMITTEE ON UNIFORM STANDARD TIME.

Presented and accepted at the Annual Meeting, January 21, 1885.

The Special Committee on Standard Time beg leave to report :

At the Convention of the Society, held at Buffalo, in June last, the Committee reported on the satisfactory progress which had been made in time reform up to that date. One of the reforms advocated by the Society had been in use throughout North America for a period of six months, with results of the most satisfactory character.

The President of the Society, in his address at Buffalo, gave prominence to the question, and pointed out that it is one of the high aims and duties of the Engineering profession "to consider and determine the most economic use of time, power and matter."

The Committee again have the satisfaction to report marked progress. Since the Buffalo Convention the International Conference, referred to in last report, has met at Washington, and has come to decisions of high importance.

On the invitation of the President of the United States, delegates from the following twenty-six nations assembled, viz. :

Austria-Hungary.	Brazil.
Colombia.	Costa Rica.
France.	Germany.
Great Britain.	Guatemala.
Hawaii.	Italy.
Japan.	Mexico.
Paraguay.	Russia.
San Domingo.	Salvador.
Spain.	Sweden.

Switzerland.
Venezuela.
Denmark.
Netherlands.

United States.
Chili.
Liberia.
Turkey.

The Conference held eight sessions, extending from the 1st October to the 1st November, and, after patient and careful deliberation, passed the following resolutions, viz.:

I.—“That it is the opinion of this Conference that it is desirable to adopt a single prime meridian for all nations, in place of the multiplicity of initial meridians which now exist.

II.—“That the Conference proposes to the Governments here represented the adoption of the meridian passing through the centre of the transit instrument at the Observatory of Greenwich, as the initial meridian for longitude.

III.—“That from this meridian longitude shall be counted in two directions up to 180 degrees, east longitude being plus and west longitude minus.

IV.—“That the Conference proposes the adoption of a universal day for all purposes for which it may be found convenient, and which shall not interfere with the use of local or other standard time when desirable.

V.—“That this universal day is to be a mean solar day; is to begin for all the world at the moment of mean midnight of the initial meridian, coinciding with the beginning of the civil day and date of that meridian; and is to be counted from zero up to twenty-four hours.

VI.—“That the Conference expresses the hope that, as soon as may be practicable, the astronomical and nautical days will be arranged everywhere to begin at mean midnight.

VII.—“That the Conference expresses the hope that the technical studies designed to regulate and extend the application of the decimal system to the division of angular space and of time shall be resumed, so as to permit the extension of this application to all cases in which it presents real advantage.”

These resolutions of the International Conference are substantially in accord with the principles laid down in the printed papers and reports of this Society. The effect of the resolutions is threefold:

1. They define and establish “a universal standard time to be common to all peoples throughout the world.” This standard time designated cosmic time* in previous publications of the Society, “may be used to promote exactness in chronology; it may be employed in astronomy, navigation, meteorology, and in connection with synchronous observations in all parts of the world. It may be regarded as the time which will be used in ocean telegraphy,” and for other purposes of a general character.

* The etymology of the word commends its use.

2. They give an authoritative recognition by the civilized nations to the twenty-four o'clock system, as the hours of cosmic time are to be counted from zero up to twenty-four without interruption.

3. They practically determine the position of twenty-four standard hour meridians around the globe. Hence complete uniformity will be obtained when the system of regulating time which has been adopted with such signal success in North America comes to be extended to other continents.

The hour meridians are not mentioned in the resolutions, but that they are nevertheless determined is obvious. The zero of the twenty four hours of each successive cosmic day is the moment of mean solar passage on the anti-prime meridian. The first hour is at the solar passage on the meridian 15 degrees westward; this, then, becomes the first hour meridian. The second hour of the cosmic day is at the solar passage on the meridian 15 degrees still further westward; this becomes the second hour meridian. And so on, in turn, each meridian which is an exact multiple of 15 degrees from zero becomes an hour meridian corresponding in number with the numbers of the successive hours of the cosmic day. The twenty-four hour meridians so determined come in the following order, viz.:

Zero—the anti-prime meridian.....	180° East and West.
1st hour meridian.....	165° East.
2d “.....	150° East.
3d “.....	135° East.
4th “.....	120° East.
5th “.....	105° East.
6th “.....	90° East.
7th “.....	75° East.
8th “.....	60° East.
9th “.....	45° East.
10th “.....	30° East.
11th “.....	15° East.
12th “.....	0° Prime Meridian.
13th “.....	15° West.
14th “.....	30° West.
15th “.....	45° West.
16th “.....	60° West.
17th “.....	75° West.
18th “.....	90° West.
19th “.....	105° West.
20th “.....	120° West.
21st “.....	135° West.
22d “.....	150° West.
23d “.....	165° West.
24th or zero of the hours.....	180° West and East.

It will thus be obvious that the conclusions of the International Conference are substantially in agreement with the scheme of time reform which the American Society of Civil Engineers has systematically promoted for some years back.

In the report of the Committee, submitted at the Buffalo Convention, special attention was directed to what is generally designated the 24 o'clock system. The report pointed out that with extreme ease and at insignificant cost all time-keepers could be adapted to the new notation. The Committee further reported that they had received communications directly bearing on this branch of the question from a large number of prominent men in every section of the country, and that 92 per cent. of those heard from were decidedly of opinion that the hours should be counted in single series from zero to 24.

As a change from the present custom of reckoning the hours to the proposed new mode affects many interests, and it could only be effected by general concurrence, especially of those controlling the various lines of railway, the Committee deem it advisable to take steps to obtain an expression of opinion on this point. Since the Buffalo Convention a correspondence has taken place between the Secretary and the Railway authorities throughout the United States and Canada. Replies have been received from 171 gentlemen, generally presidents, managers and superintendents, 98 per cent. of whom have individually expressed their sympathy with the movement, and stated that they will be prepared when it is ascertained that the feeling is general to abandon the old practice of dividing the day into halves of twelve hours each, numbered separately, and substitute therefor a single notation of 24 hours. The managers and others heard from who will support and carry out the change represent 59,100 miles of railway. A list, giving the names of those gentlemen and the lines of railway they are connected with, is appended.

The Committee feel warranted in stating that the great telegraph interests of the country are in full sympathy. They have the authority of the President of the Western Union Telegraph Company for saying that the general adoption of the 24 o'clock system, besides reducing risk of errors, would save to that company the transmission of fully one hundred and fifty millions of letters annually.

Since the conclusions of the Washington Conference were made known in Europe only a few weeks back, the 24 o'clock system has attracted marked attention. On the first of the present month it was adopted at the Greenwich Observatory, the seat of control for all the public clocks of Great Britain.

In view of all the circumstances, it appears to the Committee that the day is not far distant when a change may be successfully accomplished in this country. As in the matter of regulating time throughout North America by hour standards, it is believed that the proposed change can best be effected by the railway authorities. The Committee therefore

recommend that steps be taken to bring all the information referred to in this report, and the whole question, before the next meeting of the Railway General Time Conventions.

The Committee would particularly recommend to the railway authorities that they shall provide small printed supplementary dials—the cost of which would be hardly worthy of consideration—to be pasted upon the dials of the watches of all employees, and also supplementary dials of proper dimensions to be pasted upon the station clocks, which would familiarize employees and the public in the shortest possible time with the new system.

For the Special Committee,

SANDFORD FLEMING,

January, 1885.

Chairman.

Mr. T. EGGLESTON, M. Am. Soc. C. E.—In the absence of Mr. Fleming, the chairman of the committee, I have been requested to read the report. I wish to say, in submitting it, that since the last convention I have had the opportunity of traveling through most of the countries of Europe, and have had occasion to talk with many of the railway officials and others directly interested in this subject, and they have not only felt an immense interest in what is going on here, and thought that we had shown great enterprise in making a change of standard time in this country, but they are fully prepared for the 24 o'clock system.

Mr. Fleming and the other members of the committee are very anxious that the committee should have authority to represent the Society of Civil Engineers in the coming Time Convention of the railways, which is to be held shortly. There are two methods of doing this: either to authorize the committee to appear by proxy or in person, or else for the Board of Direction to appoint delegates to the convention. The committee are not prepared to offer a resolution, but they wish to have one of these methods considered and have some authority by which this Society may be authoritatively represented there. The committee have no authority, so far, from the Society except to do the work. I think that, although a member of the committee, I may fairly say that that work has been well done. I think if matters move as they are now moving, within the year 1885 the use of 24 hours instead of two divisions of 12 hours will be in general use.

Mr. CHARLES MACDONALD, M. Am. Soc. C. E.—Referring to a letter which I have just received from Mr. Fleming, who is unavoidably detained, he says: "I hope you will be at the meeting and be prepared to move a resolution to appoint delegates of the Society to the Time Convention."

I would therefore move that a committee of three be appointed by the Board of Direction as delegates to the approaching Time Convention.

THE CHAIRMAN.—It is moved and seconded that the Board of Direction be requested to appoint a committee of three to attend the Time Convention of the railways.

The motion was carried.

MR. FRED. BROOKS.—As the committee's report remains to be disposed of, I move that it be accepted, and that the committee be continued and requested to treat, in its next report, the decimal division of time.

The International Meridian Conference, we have just now heard, hoped that technical studies would be resumed so as to permit the application, so far as would be really advantageous, of the decimal system to the measurement of time.

As we have an able committee, now organized which has already become familiar with the principal considerations affecting time measurement, I think we had best ask it to discuss this matter of decimalization. It is a subject that has attracted the attention of civil engineers.

Mr. Frederick T. Newberry, Assistant Engineer Southern Pacific Railroad, proposed in a letter published in the Travelers' Official Guide for April, 1882, to divide time decimally, starting with the day as the principal unit. Mr. Jacob M. Clark, M. Am. Soc. C. E., Engineer Central Railroad of New Jersey, appended to the Society's Transactions for December, 1882, tables of measure which contemplate apparently the decimal division of the hour, the day being divided into 24 hours. In reckoning the time of the help at mills it is sometimes the practice now to use decimal fractions of the hour for convenience in computation; and, if ten hours is the average day's work, an approach is made to a decimal system. A third project was presented at the Meridian Conference, where it was proposed to divide the day into quarters and to subdivide those decimally; though the resolution finally adopted was in the modified form quoted in the report of our committee. The question is thus open for discussion, which of these forms of decimalization (each of which has its advantages), or what other form of decimalization, is preferable, besides the general question of what the value of decimalizing time measurement would amount to in comparison with the trouble it would make.

I should have supposed that this was a question for the future, and that it belonged to astronomers rather than to civil engineers; but as our business men and the public generally have adopted the hourly standards of time with a readiness surprising even to the leading promoters of that reform, and as we have just now been told that the English astronomical authorities have with the present year changed their practice as recommended by civil engineers, and now begin and end the day at midnight, perhaps civil engineers may usefully give further study to the subject. Prudence suggests that we look forward, if we can, to the system of the future, in order that by keeping it in view we may decide

with better judgment about any steps of change that may from time to time be urged upon us.

Mr. GEORGE S. MORISON, M. Am. Soc. C. E.—It seems to me that there is a very simple question before the Society at this moment. That question is simply, as stated in Mr. Macdonald's motion, shall a committee be appointed to represent the Society in the coming Railroad Time Convention? The only object in appointing that committee is to pass on that single question of adopting what is known as the twenty-four o'clock system. What Mr. Brooks says about the decimal subdivision of time has no doubt a great deal in it. But it is not the question we are now considering. What we want is, to have a proper representation of the Society to exert the full influence of the Society for a single and simple object.

The Chairman.—Mr. Macdonald's motion was carried.

Mr. J. J. R. CROES, M. Am. Soc. C. E.—I would suggest that Mr. Brooks' motion, with his consent, be divided. His motion embraces two different things. One is that the report be received and accepted and the committee continued. The other one was that the committee be requested to consider the question of decimal time. If Mr. Brooks would separate his motion, so as to make it first, simply that the report be accepted and the committee continued, then his other motion can come up afterwards.

Mr. F. BROOKS.—I have no objection to dividing the motion.

The Chairman.—I do not understand that Mr. Brooks' motion is seconded.

Mr. J. J. R. CROES.—Mr. Brooks accepts that amendment, and I will second the motion.

The Chairman.—That question is then now before the meeting, that the report be accepted and the committee continued.

The motion was carried.

Mr. F. BROOKS.—I move that the committee be requested in their next report to treat of the decimal division of time.

The motion was seconded.

Mr. F. BROOKS.—The division of the question ought to permit me to speak a second time. The representatives of 26 nations, called together at the Meridian Conference, having formally resolved that they hoped study would be made of the decimalization of time in cases where it would really be advantageous, it behooves the American Society of Civil Engineers, which actively favored the holding of the conference, to pay heed to its recommendation.

A *viva voce* vote was taken, but the chair was unable to decide which side had the majority.

Mr. J. J. R. CROES.—This is simply a matter for the consideration of the committee. I do not suppose that all those who voted understood the question. It is simply a request to the committee to consider that question.

A member.—It is to treat it in their report.

Mr. CHARLES MACDONALD.—I think we ought not to put it upon that committee to take up an entirely new question. Let them finish up with what they have got, and if the gentlemen have sufficient support to bring forward the question on its own merits and have a committee appointed to consider it, well and good. But I am opposed to having it grafted on the work of that committee.

Mr. GEORGE S. MORISON.—It seems to me that any such proposition as this is about as radical a thing as can possibly be supposed. It is a proposition which proposes to change our entire system of keeping time, in a manner which will be entirely different, having no common factors, as you may say, with the old system. It will involve the destruction of every clock and watch in the universe. It is far more radical than the introduction of the metric system or anything of the kind. It is something which ought not to be taken up by the Society with the slightest favor until it has been considered for weeks and months. I hope this will be voted down by a large majority.

Mr. T. EGGLESTON.—As a member of the committee, I should rather object to bringing in a report on so important a question by next June. I, for one, do not feel competent to do such a thing as that, and I do not think, as there are a large number of questions still to come before the committee which will call for active work, that it is fair to call on the committee to bring in a report on them in June next. I do not think it is quite right to give them not quite five working months to consider and report on the whole subject.

Mr. C. HERSCHEL, M. Am. Soc. C. E.—My objection lies deeper perhaps than what is mentioned, and that is as to instructing the committee on their duties. There was nothing that stood in the way of the committee reporting on the subject, had they considered it expedient so to report, and there is nothing to hinder them from reporting in the future on that subject if they consider it expedient. I really hope that my friend Mr. Brooks will withdraw the motion. It seems to me an unnecessary one. The committee can report if they please, and they have proved themselves a very wise and hardworking committee.

Mr. F. BROOKS.—If the meeting is at all embarrassed by it, I have no objection to withdrawing the motion. I withdraw the motion.

The report of the Committee on "Uniform System for Tests of Cement" was then presented and read.* A minority report of the committee* was also presented and read. The subject was discussed by Messrs. A. P. Boller, J. J. R. Croes, F. O. Norton, F. Collingwood, H. R. Towne, James Owen, L. F. Beckwith, Charles Macdonald and Charles B. Brush.

On motion the majority and minority reports were accepted with the thanks of the Society, and the committee discharged.

* To be published in the Transactions.

A recess was then taken until evening.

The session was resumed at 20 o'clock. It was moved that the committee to which had been referred the subject of a Uniform System for Tests of Cement, be requested by the Board of Direction to consider the subject of the compressive strength of cement, and also of the actual compression of cement and the settlement of masonry, and the Board be empowered to fill the place of any members of that committee who may not be desirous of serving upon this continued investigation. After discussion by Messrs. F. Collingwood, T. C. McCollom and William P. Shinn the motion was adopted.

Mr. Oberlin Smith, M. Am. Soc. C. E., moved that the subject of the proposed reform in the United States Patent Office be referred to the Board of Direction, to consider whether any action of the Society may be taken in this matter. After discussion by Messrs. Oberlin Smith, J. P. Davis and Theodore Cooper, the motion was carried.

Mr. William P. Shinn, M. Am. Soc. C. E., presented the following resolution:

Resolved, That the President be authorized to appoint a committee, consisting of five members, to confer with committees appointed by kindred societies, for the purpose of devising and considering a plan for creating a library for the joint use of the organizations represented by the committees in conference; said plan to be reported to the society for such action as may be desirable.

Mr. HENRY R. TOWNE, M. Am. Soc. C. E.—As a member of the Library Committee of the Society of Mechanical Engineers, I am familiar with the subject covered by the resolution, and I wish to suggest one amendment to it. In making provision, as we have recently, in the Society of Mechanical Engineers, for the creation of a library fund, our first difficulty is encountered in the shape of where to put it, the need of a room or building, and I suggest this, whether it is not expedient that whatever committee may consider this question of a joint library should simultaneously consider the question of joint accommodation for the two or three societies that are likely to become united in this manner. It, of course, involves no committal of this Society, or any of them, to joining in that way, unless it should seem expedient to all of them. A library cannot exist without some place to keep it in, and wherever the library is kept becomes naturally the headquarters of the owners of the library. I offer an amendment that the committee, if appointed, shall consider both questions—a joint library and a joint accommodation for the societies owning the library.

Mr. JOSEPH P. DAVIS, M. Am. Soc. C. E.—I think the resolution as offered is a somewhat mysterious one. We do not know what societies are included nor the object of the resolution, and would like to have the matter a little more clearly expressed.

Mr. HENRY R. TOWNE.—I can answer that question from the fact that I have participated in the discussion concerning this matter with the members of two other societies—the Mechanical Engineers and the Mining Engineers—and I think so far as the matter has taken any shape at all in formal discussions, it has been with the hope that at some time in the future the three engineering societies now existing, with possibly at some time, the addition of a fourth, the Electrical, may unite in having a central headquarters, presumably in this city, where a library shall be located, common to all of the societies, and where also they may unite in a building in which all can have suitable places for meeting, and where by reason of the larger number that will in that way be brought together, any of us happening in at any time will be likely to find friends and acquaintances whom it will be pleasant to meet. I think the whole project is one certainly worth careful consideration by a committee and by the Society in the form that the committee may report.

Mr. J. J. R. CROES, M. Am. Soc. C. E.—As chairman of the Library Committee for a number of years, though I do not know what I may be in the future, I think that this project is worthy of very serious consideration. I think, also, that it should be considered by those who have been conversant with the management and affairs of the Society, and for that reason I think that it should be referred to the Board of Direction, because four or five gentlemen who have not been familiar with the affairs of the Society, could hardly consider it as fairly with regard to the interests of this Society as those who are officially well informed as to those affairs. While I do not desire to have anything to do with it myself, still it is a matter that I would take a good deal of interest in, and I should be very glad to see it take the course suggested.

Mr. M. N. FORNEY, M. Am. Soc. C. E.—Mr. Chairman, Mr. Davis remarked that there was something apparently mysterious about this resolution. In order to take that impression from his mind, I would say that there is nothing mysterious at all about it. There are a number of persons, some of them connected with more than one of the societies, who have had under consideration for some time the propriety of creating a joint library to be used by the members of all the associations. It seemed to them the very height of folly that more than one association in the City of New York should undertake to duplicate a series of books; whereas one set of books would answer equally well for all the societies. Of course, the money expended, if concentrated upon one library, would go a great deal further in creating a perfect library than if divided among two or more separate organizations. The purpose of it then was simply to get together committees from the different engineers' associations, and have them say whether any plan which would be satisfactory to this Association could be devised, and also satisfactory

to the other associations. There is no intention of springing any mysterious plan upon any of the organizations.

With reference to the remarks of Mr. Croes, I think they are very pertinent, and I think that the members of the old Library Committee would probably be the most competent to advise and to suggest means of bringing about this result. I hope that the matter will not be referred to the Board of Direction, but that a committee will be appointed now. There is no danger incurred. The committee have no authority except to confer with other committees of a similar character. When they report to the Society their report can be accepted, laid on the table, or any other disposition can be made of it. But certainly no harm can come of an interview of this kind, and I can see that in the future very great good may come from it.

There is at the present time no adequate engineering library in this country. There is no place where a person engaged in any investigation covering a considerable ground can find a collection of books which is even respectable upon engineering subjects. It strikes me that this is a disadvantage to the profession, and that there should be some union among engineers throughout the length and breadth of the land for creating a library which would be adequate to the needs of engineers.

There is one other question in this connection which I think the committee should consider, and that is, that if a library is collected, some steps should be taken to have an index. If any one has taken the trouble to examine the admirable work that Mr. Croes has done in indexing the railroad books of this country, he will be convinced of the value of an index of the whole library. Such an index has this advantage—it is useful from the moment it is commenced; when successive periodicals are indexed, its value grows as the work goes on. I therefore hope that the committee that takes this matter into consideration will take that branch of the subject up at the same time.

Mr. M. M. TIDD, M. Am. Soc. C. E.—It seems to me that a very direct way of attaining the desired object would be to consolidate the societies. It seems to me the height of folly to maintain separate organizations whose interests are the same. I think if the societies were consolidated it would consolidate the library.

Mr. M. N. FORNEY.—I would say that that matter has been discussed among a great many members of the Society of Mechanical Engineers and the Society of Civil Engineers. There are very great objections, however, to doing that. Birds of a feather naturally flock together, and the civil engineers have one feather and the mechanical engineers have a somewhat different feather. And, therefore, it seems to me that it will rather cumber the project if that is entertained at the present time. If in the future it should become desirable to consolidate the societies in any way, it will come about naturally. I therefore hope that that will not be added to the resolution at the present time; because I think it will be an obstacle in the way of accomplishing the project at present in view.

Mr. O. E. MICHAELIS, M. Am. Soc. C. E.—I think that the gentlemen who favor this project are entitled to have the matter considered by a committee that probably would be favorable to their views. At the same time I think that the question involved is a very important one. It involves the matter of consulting with other societies, and I think on that subject it should be submitted to a vote of all the members of the Society. I think we have some six or seven hundred members, and it seems to me it is a matter for letter ballot. I can see no objection to a committee being appointed at this meeting to consider the subject purely from the standpoint of the American Society of Civil Engineers. That committee might present their views on the advisability of this step, and then I think it should be submitted by letter ballot to all the members of the Society, whether it be proper to consult with other societies with a view of getting up a united project. I think the committee to be appointed should be confined to consider the advisability of the work, without, however, consulting with other societies until authority has been given by means of a letter ballot.

Mr. M. M. TIDD.—I do not wish to be understood as opposing the matter, but merely to suggest that that might be part of the question which the committee should consider. We have among us many mechanical engineers who take as much interest in our meetings as any one, and I do not see why they could not all come in as well as part of them. I have been brought up with both of them. I take an equal interest in both.

Mr. JOSEPH P. DAVIS.—I fully agree with my friend Mr. Forney. I think the question should be referred to a committee who can consider the whole subject, and I think that committee is our Board of Direction. We have our President, who is both a mechanical engineer and a civil engineer, and I will offer a resolution that the whole matter be referred to the Board of Direction. (Seconded.)

Mr. H. R. TOWNE.—Before a vote is taken on this question I wish to appeal to the members to consider seriously whether it is wise to put this additional burden on the Board of Direction. They have, I do not doubt, numerous questions before them, and it is doubtful whether, with the other more important duties that they have, this can have the time and attention from them that I fully believe it deserves. The President of the Society is *ex-officio* member of all its committees, and the committee that may be appointed will have the benefit of his counsel, and a special committee can surely best take up a subject of this kind and get it in shape and submit it to the Board of Direction if necessary. But it is asking too much of the Board of Direction, it seems to me, to require them to do this preparatory work, and it would be more just to them and more just to the movers that it should be referred first to a special committee, and that committee, if it sees fit, can report primarily to the Board of Direction.

Mr. THEODORE COOPER, M. Am. Soc. C. E.—I think it ought to be referred to parties more independent than the Board of Direction. It is simply to report on a project. We could afterwards consider the feasibility of it, and I think, for that reason, we had better appoint a committee who are independent of any official position, and we can then take into consideration any project.

My friend Mr. Forney says that we are a society of one feather, but the other societies haven't any feather at all so far as a library is concerned. How can we consolidate then with the other societies? That would be consolidating one feather. Can we make one feather do for three? I am sure that the Board cannot do so. But there may be other members who are more competent to do that.

Mr. EDWARD P. NORTH, M. Am. Soc. C. E.—I agree fully with Mr. Cooper in his idea that this should not be thrown on the Board of Direction. I believe, whenever it is desirable to have a thing done, to appoint the men to do it who proposed to do it. The gentlemen who proposed this move, and who started it, are, it seems to me, the men to go on the committee—not the Board of Direction. With a good deal of respect for the Board, collectively and individually, I shall vote against Mr. Davis's motion.

Mr. JOSEPH P. DAVIS.—I have been on the Board of Direction for several years, and I have found, if anything is done, it is done by the Board of Direction. However, I will withdraw my motion.

Mr. O. E. MICHAELIS.—I rise to contradict some of the remarks which have been made. I know of some work that has been submitted to committees that has not been done by the Board of Direction, though they might have done it.

Mr. JOSEPH P. DAVIS.—The Board of Direction have had to traverse the work of Special Committees and smooth out a great deal that has been done by Special Committees.

Mr. F. COLLINGWOOD, M. Am. Soc. C. E.—It seems to me that if we are to have a fair presentation of all sides of the question, we ought to appoint a committee who will represent the Society pure and simple, and put in some members also who belong to other societies.

Mr. C. J. H. WOODBURY, M. Am. Soc. C. E.—I am one of the members of the Library Committee of the Society of Mechanical Engineers, and I learn, this afternoon, that, in response to a circular sent out six weeks ago, four-tenths of the members of that society have subscribed to a fund, either subjecting themselves to an extra annual payment towards a Library Fund, or else paying a lump-sum of a considerable amount. The Mechanical Engineers do have something of a library, and it is their intention to increase it and to make it something of value. If there could be any possible project by which an engineering library in New York could be increased without unnecessary duplication of volumes, it would certainly add very much to the usefulness of such a

library to any engineer, whether he calls himself a mechanical engineer or a civil engineer. You know the late Mr. Worthington was once asked whether he called himself a mechanical engineer or a civil engineer, and he replied that he was content to call himself a pump-maker, and he tried to make good ones.

Mr. OBERLIN SMITH, M. Am. Soc. C. E.—I am a member of the Mechanical Engineers' Society, and I heard some of their discussions regarding library matters. I decidedly favor this project to appoint an independent committee to confer with committees of the other societies. The committee ought to consist of five members, I should think, and the suggestion of one gentleman, that it should be composed of men representing the general feeling of the Society, is, I think, a good one. As to the question of having a great library in New York, I do not think there can be two sides to it; as to the expense of duplicating those books, there is but one side to it—it ought not to be done. Whether the societies want to come together in that way remains to be seen. But there can be no harm in appointing that committee. It is simply appointing a committee to make a report, and then the whole thing can be voted down if it is not approved of.

As to the matter of feathers, if the other societies come in with half a feather, or one-third, the whole expense and value of those feathers can be divided up *pro rata*, and no doubt any societies that come in would be perfectly willing to pay their share in the new library, whether in the form of books or in money.

Mr. WILLIAM P. SHINN, M. Am. Soc. C. E.—Before the question is put I would like to make one or two remarks, as the mover of this resolution, which has been amended and re-amended until it has got back to its original form. In drafting that resolution, which I did with the suggestions of Mr. Forney, all other matter than what is contained in it was purposely omitted, in order to confine ourselves to the discussion of this question of creating a joint library. Mr. Cooper's remarks about consolidating libraries do not at all apply to this resolution, as it says nothing at all about consolidating libraries. It speaks about devising a plan for creating a joint library, in which, as a matter of course, the parties jointly interested will contribute in some agreed proportion, as has been stated, either in money or books. It is a general principle recognized in parliamentary law that a committee appointed to consider any subject should be a committee friendly to that subject, and, as Mr. North has suggested, not a committee for the purpose of killing it. I have no preference at all as to the membership of the committee, but I merely wish to explain the situation.

As to the further suggestion that the best way is to consolidate the societies themselves, gentlemen will certainly see that is entirely, not merely, beyond the range of the subject under consideration, but it is absolutely out of the question. The Institute of Mining Engineers is

not a professional society at all. This Society has a professional standard for membership. The Institute of Mining Engineers has no professional standard, and consequently it would be impossible to consolidate it with this Society. All such suggestions as that are entirely foreign to the question under consideration.

Mr. HENRY R. TOWNE.—My motion is that the original motion be amended to include not only the subject of a library, but the joint accommodation of the societies represented in the conference.

Mr. OBERLIN SMITH.—I second that motion.

Mr. M. N. FORNEY.—I hope Mr. Towne will withdraw his motion, not because I feel any opposition to it, but because I think it will jeopardize the original resolution.

The proposed amendment was not carried.

The original resolution as stated above was then carried.

After a request from the Chairman that members should present any business that they might desire to bring up, none being presented, the Annual Meeting adjourned.

Detailed descriptions were then given, illustrated by drawings of the works, which it was proposed to visit on the next day.

THURSDAY, JANUARY 22.—The members met at the Society House at 9 o'clock, and thence went to the New York station of the Consolidated Gas Company, at the foot of East Twenty-first street, where, by invitation of that company, tendered through Mr. T. F. Rowland, M. Am. Soc. C. E., the works were inspected, and the latest improvements in the manufacture of Illuminating Gas by the Decomposition of Water, were explained. An engraving, illustrating the processes, with a printed description, was handed to each member of the party.

A steamboat, furnished by the kindness of Mr. T. F. Rowland, was then taken at the foot of East Twenty-first street, and proceeded through the East River to Dow's Stores, at the foot of Pacific street, Brooklyn, where, by invitation of the owners and lessees of the stores, tendered through Mr. George B. Mallory, M. Am. Soc. C. E., an inspection was made of the Grain Elevators and Distributors and of the Transmission of Power by swift-running Wire Rope.

Taking the steamer again, the party proceeded to Pier number One, North River, and to the Washington Building, No. 1 Broadway. An inspection was made of that building and of the extended view from its roof, and afterwards, by invitation of Cyrus W. Field, Esq., the members of the Society took lunch with him in the Washington Building.

After lunch the party proceeded to the Produce Exchange, where, under the escort of the Building Committee and of George B. Post, Esq., the architect of the building, it was examined. The very complete elevator service of this building was inspected, and was described by Mr. Thomas E. Brown, M. Am. Soc. C. E., the engineer in charge of its

construction. Each member of the party was furnished with a printed description of these elevators illustrated by drawings.

Again taking the boat, the party proceeded to the New York pier of the New York and Brooklyn Bridge, inspected the masonry of the New York approach, and then, crossing the bridge, inspected the details of the cable machinery. There were furnished to the party a printed memoranda of the important details and dimensions of the bridge, and also drawings, showing the fluctuation of travel at particular hours of the day; showing the horse-power expended in the transportation of cars, and showing also the disposition of the cable machinery. Returning to the New York side, the party proceeded by the Elevated Railway to the Central Station of the United States Electric Illuminating Company, at 36 Stanton street, where, by invitation of the officers of that company, the very large electric light apparatus was examined.

In the evening a reception, with supper, was held at the Society House. During the evening the following communication was read from Mr. Squire Whipple, Hon. M. Am. Soc. C. E.:

ALBANY, January 21st, 1885.

To the Committee of Arrangements for the Annual meeting of the Am. Soc. C. E.:

Dear Bogart, Collingwood and Stauffer,
 What's life, but *be*, and *do*, and *suffer*?
 And what avail the other two
 To one ayont the power *to do*?
 I've doffed the armor, left the field,
 With all the triumphs it may yield,
 To those a half a cent'ry younger,
 Who still for fame and fortune hunger;
 With clearer brain and stronger muscle
 'Gainst obstacles to tug and tussle.
 I've had my day, nor wish another,
 With meager fun, and mickle pother.
 Still, doubt you not a single minute,
 There's glory yet for those who win it.
 Grade up your valleys, pierce your mountains,
 Sink your mines and dam your fountains;
 Cut down your hills and bridge your rivers
 With cables, trusses, cantilevers.
 Let nothing daunt, let nothing stagger ye,
 From Tehuantepec to old Niagara.
 Let every town have wholesome water,
 And *chloroform* the beasts they slaughter.
 If ocean bars arise to fret ye,
 Bold Eads can move them with a jetty;
 Or wed Atlantic to Pacific
 With iron bands quite scientific.
 And, when you need electric medicine,
 Just call on Bell, or Brush, or Edison.
 Each knows full well which end his head is on.

But, if you've news 'cross seas to wire us,
 You'd better leave the Field to Cyrus.
 And, when we think of deeds ennobling,
 Who'd e'er forget the name of Roebling?

But rhyming's not my avocation,
 And but for this unique occasion
 I never should have once attempted
 To pump a brain so quickly emptied;
 And, if the folly you'll excuse,
 Of this attempt to court the Muse,
 You may depend that old S. W.
 No more will *thus* presume to trouble you.

Upon the invitation of the President of the Society, Mr. Horatio Allen, past President and Hon. M. Am. Soc. C. E., addressed the Society as follows:

MR. HORATIO ALLEN, Hon. M. Am. Soc. C. E.—Mr. President—
 At a meeting of this Society, very much of the character of that of this evening, but so long back that it may be that there is no one who hears me now heard me then, I was led, by remarks addressed to me, to refer to some of the early incidents of railroad history. What I said was followed by a resolution, carried by acclamation, that I should commit to paper my reminiscences of that early period. At the meeting of the following year inquiry was made as to the resolution, to which I made answer that "No resolution had been transmitted to me by the Secretary." An answer, I have to admit, neither respectful to the Society nor just to the Secretary.

Perhaps a better answer would have been, that there was so much in the reminiscences that was of personal character that it was quite as well to leave them for the after-dinner hour. Be that as it may, now at this late day, when the interest to others may be less, as it certainly is to me, I come in mid-winter from foreign parts to say, at nearly midnight, that the matters of railroad history then referred to are now in print, and, that if acceptable to the Society, some three or four hundred copies of the pamphlet bearing title, "The Railroad Era; First Five Years of Its Development" (Horatio Allen, New York), will be sent to the House of the Society, for issue as found advisable.

In explanation of the printing of this pamphlet, I refer to the sentences that precede the first page of the pamphlet, which read as follows:

"The article that follows had its origin in my having accepted the special invitation of the Commissioners of the 'National Exposition of Railway Appliances,' to be held in Chicago in June, 1883, to visit the exhibition, and at the appropriate time present such reference to early railroad development as circumstances permitted. My friends of the 'Railroad Gazette' informed me that in such event they would have stenographic notes taken for a report that would appear in their paper.

"When the time came, circumstances did not permit so full a presentation as the subject called for, and on the receipt of the report prepared for the 'Gazette' I decided to make it more complete, and that what was thus summarily presented might meet the eyes of many to whom it would be of interest in this land, where the railroad era has perhaps its greatest development, to have it also before the public in pamphlet form.

"HORATIO ALLEN.

"HOMEWOOD, South Orange, N. J."

After the pamphlet was in print and only a few copies had been sent to personal friends, I was led, for reason not necessary to state, not to send out any more.

A few months back, when that reason no longer had weight with me, a friend in London sent me a "Blue Book," published by the British Government, containing a report on the Pennsylvania Railroad, and preceded by a reference to the early action as to railroads in the United States, so incomplete and inaccurate that more information as to that early period was felt to be necessary, and that it was certainly of interest to us of the United States, that some account more complete and more accurate should be within knowledge of the public.

To that end, I addressed a note to the Secretary of this Society saying that I intended to have the pleasure of attending the next Annual Meeting of the Society, and of making that presentation and adding some remarks.

If the opportunity of making the remarks had occurred earlier in the evening they would have had reference to some of the Civil Engineer workers of that day—such men as George Stephenson, Jesse Hartley, of the Liverpool Docks, James Walker, of London, with whom I had the pleasure and benefit of an intimate personal knowledge.

It has been my good fortune in a life in the sister avocations of Civil and Mechanical Engineering to have been early in the field in the two great eras of this century—the transportation by steam across continents from ocean to ocean, and the transportation by steam across oceans from continent to continent, and have taken some part in each; and I greatly regret that I have not been a note-taker. The record of incidents and occurrences and of anticipations would have been of more interest, and, as matter of testimony, of more weight, than a reference after the facts named, as anticipated, have occurred.

Gentlemen, many of you are or are to be workers in another era, the era of electricity, with which I have had little to do, though I was one of the earliest to whom Henry, then of Albany, showed his first experiments, the germ of so much that has taken place since, and the end is not yet.

The members of the Society, 138 in number, present at the Annual Meeting, excursions, etc., were: Julius W. Adams, Horatio Allen, Edward R. Andrews, John W. Bacon, Fred. H. Baldwin, Arthur Beardsley, L. F. Beckwith, George H. Bishop, H. Bissell, H. D. Blunden, John Bogart, Alfred P. Boller, William F. Booth, Fred. Brooks, Charles O. Brown, Thomas E. Brown, Jr., George H. Browne, Charles B. Brush, L. L. Buck, Frank A. Calkins, Robert Cartright, N. Cheney, Thomas C. Clarke, Francis Collingwood, Alfred G. Compton, Casimir Constable, Theodore Cooper, O. H. P. Cornell, J. James R. Croes, J. Foster Crowell, Charles G. Darrach, Joseph P. Davis, P. P. Dickinson, James B. Eads, Thomas Egleston, Charles E. Emery, M. T. Endicott, L. P. Evans, John W. Ferguson, Samuel J. Fields, Albert Fink, Clark Fisher, M. N. Forney, George H. Frost, Frank L. Fuller, E. L. B. Gardiner, Martin Gay, Charles E. Goad, Bryant Godwin, Frederic Graff, William H. Grant, Samuel M. Gray, George S. Greene, Jr., A. R. Haddock, Stephen S. Haight, William G. Hamilton, S. A. Harrison, William J. Haskins, Sullivan Haslett, Charles H. Haswell, Clemens Herschel, Albert B. Hill, W. E. Hill, John Houston, Frank H. Howes, Charles W. Hunt, William R. Hutton, S. J. Johnson, George A. Just, Walter Katte, William E. Kelly, Joseph M. Knap, Gustav Lehlbach, G. Leverich, A. W. Locke, Thomas J. Long, Gorham P. Low, Charles Macdonald, William W. Maclay, John MacLeod, Edward E. Magovern, C. C. Martin, George B. Mallory, William J. McAlpine, Thomas C. McCollom, D. E. McComb, George W. McNulty, William Metcalf, Thomas C. Meyer, O. E. Michaelis, George S. Morison, Charles Neilson, W. A. Nichols, George H. Norman, Edward P. North, F. O. Norton, E. B. Noyes, F. S. Odell, L. F. Olney, S. B. Opdyke, John F. O'Rourke, James Owen, A. B. Paine, William H. Paine, Henry W. Parkhurst, John A. Partridge, P. A. Peterson, H. W. B. Phinney, Joseph R. Richards, Thomas F. Rowland, George M. Rusling, C. O. Schneider, Alfred F. Sears, William H. Searles, William P. Shinn, R. I. Sloan, Hamilton Smith, Jr., T. Guilford Smith, Lucius A. Smith, Oberlin Smith, J. F. Sorzano, D. McN. Stauffer, Frank S. Stevens, Cook Talcott, M. M. Tidd, Stevenson Towle, Henry R. Towne, Alfred W. Trotter, John G. Van Horne, E. B. Van Winkle, Charles D. Ward, F. W. Watkins, A. M. Wellington, Edmund B. Weston, William H. Wiley, William W. Wilson, C. J. H. Woodbury and William E. Worthen.

OF THE BOARD OF DIRECTION.

JANUARY 7th, 1885.—Applications were considered. The Annual Report was discussed.

JANUARY 14th, 1885.—Applications were presented. Action was taken as to preparation of form of notice of applications under the provisions of the recently amended By-laws. The Secretary presented final draft of Annual Report, which was considered, revised and adopted. Arrangements were considered as to the Annual Meeting. Financial business was transacted. Letters inviting the Society to hold its Convention in London, in 1886, were presented and directed to be read at the Annual Meeting. The following report was presented:

REPORT OF COMMITTEE TO INQUIRE INTO THE PRACTICABILITY OF THE
AMERICAN SOCIETY OF CIVIL ENGINEERS, TAKING PART IN THE INTER-
NATIONAL INVENTIONS EXHIBITION TO BE HELD IN LONDON, ENGLAND,
IN 1885.

The committee has the honor to report that, having discussed the question of the Society taking part in this Exhibition, it is of the opinion that such participation would not be desirable.

January 7th, 1885.

THOMAS C. CLARKE,
M. N. FORNEY,
C. C. SCHNEIDER,
EDWARD P. NORTH,
L. L. BUCK,

The report was accepted and adopted.

Committee.

JANUARY 23d, 1885.—In accordance with the provisions of the Constitution, the following Standing Committees were appointed:

On Finance: Messrs. G. S. Greene, Jr., William R. Hutton, O. Chanute.

On Library: Messrs. J. J. R. Croes, T. J. Whitman, Theodore Cooper.

ANNUAL REPORT.

REPORT OF THE BOARD OF DIRECTION FOR THE YEAR
ENDING DECEMBER 31, 1884.

PRESENTED AND ACCEPTED AT THE ANNUAL MEETING, JANUARY 21ST, 1885.

The Board of Direction, in compliance with the provisions of the Society law, presents its report for the year ending December 31st, 1884.

MEMBERSHIP.

As shown by the tabular statements hereafter given, there has been during the year an addition of 111 to the various classes of Society membership, including two subscribers to the Building Fund not otherwise connected with the Society. In this nominal addition of 111 there are 1 former Associate, transferred to Member, 9 former Juniors, transferred to Members, and 1 former subscriber to the Building Fund, who has during the year become a Member of the Society. Therefore the actual new additions to the Society membership during the year have numbered exactly 100.

The losses from Society membership have been 17, being 11 by death and 6 by resignation. The number of persons now connected with the Society is 878, being 83 greater than at the end of the previous year.

The actual net increase during the year and the present total in each class of membership are:

Honorary Members,	increase during year	1	Total.....	10
Corresponding Members,	"	"	" ..	3
Members,	"	68	" ..	657
Associates,	"	3	" ..	34
Juniors,	"	10	" ..	77
		82		781
Fellows, not included above, "	"	"	" ..	57
		82		838
Subscribers to Building Fund, not included				
above, increase during year.....		1	" ..	40
Increase during year.....		83	" ..	878

This addition of 100 new names to the Society membership during the year, and also the net increase of 83 in membership, is greater than has occurred in any previous year in the history of the Society.

Tables showing the classification of membership at the beginning of the year and the changes during the year are given in a subsequent part of this report.

THE ANNUAL CONVENTION.

The Annual Convention was held at the City of Buffalo, June 10th to 13th of the past year. The attendance of those belonging to the Society numbered 209, and a large number of the ladies of the families of members accompanied them on the occasion. A detailed report of the Convention has been published in the Proceedings of the Society for June. The Local Committee at Buffalo was active in perfecting the arrangements, and the Convention was interesting and memorable in many respects. A peculiar feature was the preparation of a handsome souvenir, made under the direction of the Local Committee, a copy of which was presented to each member in attendance. The volume was entitled "Some Things In and About Buffalo; a Souvenir of the Annual Convention of the American Society of Civil Engineers." It was printed in colors, on heavy paper, and illustrated by photographic views of points of particular interest in and about Buffalo. The cover was illuminated and the volume, in all respects, artistic and beautiful.

The hospitality of the citizens of Buffalo, on this occasion, is particularly acknowledged. Excursions for the purpose of enabling visitors to examine matters of engineering interest in that vicinity, and also for the purpose of making them acquainted with the citizens of Buffalo, were provided and excellently managed. Visits were made to Niagara Falls and to Chautauqua Lake.

By the invitation of the officers of the New York, West Shore and Buffalo Railway Company, and the New York, Ontario and Western Railway Company, tendered through Mr. E. L. Corthell, M. Am. Soc. C. E., Chief Engineer of the New York, West Shore and Buffalo Railway Company, all members with their families, who were able to do so, took part in an excursion over those roads from New York to Buffalo on the day previous to the Convention, and returned from Buffalo to New York on the day succeeding the Convention. This excursion was very interesting and comfortable, and greatly enjoyed and appreciated by all who took part in it.

FUTURE CONVENTIONS.

The increased attendance at the Annual Conventions and the great influence upon the welfare of the Society, which it is believed these Conventions have exercised in the past, and will, if properly managed, exercise in the future, has led the Board, in common with many other members of the Society, to consider with much care whether it would

not be well to make different arrangements in some respects, under the circumstances which exist. The subject has been discussed at meetings of the Society; has been considered by a committee and by the Board, and the views of the committee and the Board have been, both as to the management of the Conventions and as to the presentation, reading and discussion of papers, embodied in circulars, which have been mailed some time since to our members, and which are as follows:

In view of the fact that a number of members of the Society have expressed the opinion that our Conventions have not been giving satisfactory results, and particularly that the number of days to which they are necessarily limited does not give sufficient time for all that has been attempted; and in view also of the fact that the Board has been particularly requested to consider whether some modifications might not be properly made in the conduct of the Conventions, the following considerations are presented by the Board to our members:

These considerations are in harmony with a report prepared by a committee of members of the Society appointed to consider the subject.

It has been evident to those who have attended the Conventions of the last few years that some modification should be made, if the best results, which are believed to be practicable, are to be hereafter secured.

Some of the undesirable features are:

(1.) The entirely too limited time given to the presentation and discussion of professional papers.

(2.) The entirely too large amount of time taken up in local excursions and visits by the whole body of the Convention to points and objects which are not really of general interest.

(3.) The feeling of obligation which arises from the fact that members, resident at the place of the Convention, have raised large sums of money through contributions from themselves, and from other persons generally interested in engineering, or desiring that the Society should enjoy its visit; and, in this connection, the feeling that the money must be spent in providing the excursions alluded to, and in furnishing entertainments which are of a more elaborate character than is requisite for the entire enjoyment of the members and visitors.

All of these considerations are interdependent; they have arisen from no special fault on the part of any who have been active in promoting past Conventions; but the feeling that a change ought to be made certainly exists, and certainly should be considered.

It is suggested that an entirely new method of holding our Conventions may be tried with sufficient promise of success to warrant the experiment, and this new method, in general terms, may be:

To hold a Convention not at any large city, nor upon the invitation of local members; but to secure, if possible, a place where all can be accommodated in a proper way, and where the Convention can be arranged and managed entirely with reference to the best assurance of

This addition of 100 new names to the Society membership during the year, and also the net increase of 83 in membership, is greater than has occurred in any previous year in the history of the Society.

Tables showing the classification of membership at the beginning of the year and the changes during the year are given in a subsequent part of this report.

THE ANNUAL CONVENTION.

The Annual Convention was held at the City of Buffalo, June 10th to 13th of the past year. The attendance of those belonging to the Society numbered 209, and a large number of the ladies of the families of members accompanied them on the occasion. A detailed report of the Convention has been published in the Proceedings of the Society for June. The Local Committee at Buffalo was active in perfecting the arrangements, and the Convention was interesting and memorable in many respects. A peculiar feature was the preparation of a handsome souvenir, made under the direction of the Local Committee, a copy of which was presented to each member in attendance. The volume was entitled "Some Things In and About Buffalo; a Souvenir of the Annual Convention of the American Society of Civil Engineers." It was printed in colors, on heavy paper, and illustrated by photographic views of points of particular interest in and about Buffalo. The cover was illuminated and the volume, in all respects, artistic and beautiful.

The hospitality of the citizens of Buffalo, on this occasion, is particularly acknowledged. Excursions for the purpose of enabling visitors to examine matters of engineering interest in that vicinity, and also for the purpose of making them acquainted with the citizens of Buffalo, were provided and excellently managed. Visits were made to Niagara Falls and to Chautauqua Lake.

By the invitation of the officers of the New York, West Shore and Buffalo Railway Company, and the New York, Ontario and Western Railway Company, tendered through Mr. E. L. Corthell, M. Am. Soc. C. E., Chief Engineer of the New York, West Shore and Buffalo Railway Company, all members with their families, who were able to do so, took part in an excursion over those roads from New York to Buffalo on the day previous to the Convention, and returned from Buffalo to New York on the day succeeding the Convention. This excursion was very interesting and comfortable, and greatly enjoyed and appreciated by all who took part in it.

FUTURE CONVENTIONS.

The increased attendance at the Annual Conventions and the great influence upon the welfare of the Society, which it is believed these Conventions have exercised in the past, and will, if properly managed, exercise in the future, has led the Board, in common with many other members of the Society, to consider with much care whether it would

not be well to make different arrangements in some respects, under the circumstances which exist. The subject has been discussed at meetings of the Society; has been considered by a committee and by the Board, and the views of the committee and the Board have been, both as to the management of the Conventions and as to the presentation, reading and discussion of papers, embodied in circulars, which have been mailed some time since to our members, and which are as follows:

In view of the fact that a number of members of the Society have expressed the opinion that our Conventions have not been giving satisfactory results, and particularly that the number of days to which they are necessarily limited does not give sufficient time for all that has been attempted; and in view also of the fact that the Board has been particularly requested to consider whether some modifications might not be properly made in the conduct of the Conventions, the following considerations are presented by the Board to our members:

These considerations are in harmony with a report prepared by a committee of members of the Society appointed to consider the subject.

It has been evident to those who have attended the Conventions of the last few years that some modification should be made, if the best results, which are believed to be practicable, are to be hereafter secured.

Some of the undesirable features are:

(1.) The entirely too limited time given to the presentation and discussion of professional papers.

(2.) The entirely too large amount of time taken up in local excursions and visits by the whole body of the Convention to points and objects which are not really of general interest.

(3.) The feeling of obligation which arises from the fact that members, resident at the place of the Convention, have raised large sums of money through contributions from themselves, and from other persons generally interested in engineering, or desiring that the Society should enjoy its visit; and, in this connection, the feeling that the money must be spent in providing the excursions alluded to, and in furnishing entertainments which are of a more elaborate character than is requisite for the entire enjoyment of the members and visitors.

All of these considerations are interdependent; they have arisen from no special fault on the part of any who have been active in promoting past Conventions; but the feeling that a change ought to be made certainly exists, and certainly should be considered.

It is suggested that an entirely new method of holding our Conventions may be tried with sufficient promise of success to warrant the experiment, and this new method, in general terms, may be:

To hold a Convention not at any large city, nor upon the invitation of local members; but to secure, if possible, a place where all can be accommodated in a proper way, and where the Convention can be arranged and managed entirely with reference to the best assurance of

carrying out the objects which make it desirable that Conventions should be held. It is suggested that these objects are :

(a.) The presentation, consideration and undisturbed discussion of professional subjects.

(b.) The opportunity for free intercourse between members of the Society gathering at our Conventions from all parts of the United States, and, in fact, of the world.

(c) Such opportunities for social recreation as may not interfere with, but rather aid the other two objects mentioned above.

It is suggested that the Convention can be held at some large hotel, preferably not in a city. Those who were present at the St. Paul and Minneapolis Convention of last year will remember the Hotel Lafayette, at Lake Minnetonka. There are other hotels in other parts of the country fully as large, and located, many of them, in delightful situations. Doubtless, a committee of the Board of Direction can find such a location and can secure ample accommodations on reasonable terms, where all the requisites for comfortable meetings can be had, where the opportunity will be afforded for pleasant intercourse, and where no calls will be made upon the members which will interfere either with the professional or social enjoyment of the occasion.

Some of our members who have discussed this subject have already made inquiries and have found several such places. With proper arrangements, the meetings of the Society during the Convention, held in such a hotel, would give ample time for entirely free and uninterrupted discussion. The classification of papers and subjects, as suggested in a circular accompanying this, could be made to add largely to the interest of discussions. The hours not devoted to meetings would give excellent opportunities for the more intimate acquaintance of our members with each other. Every provision could be made for the comfort of the members and their families without interfering with the other objects of the Convention.

It is suggested that the experiment be tried, and that the Board of Direction be authorized to secure such provisions for the next Convention as have been outlined above.

The Board asks for this subject the earnest consideration which its great importance to the welfare of the Society demands.

A blank form for the return of the views of members is sent herewith, and it is particularly requested that these be filled out and forwarded to the Secretary. The replies will be reported to the Annual Meeting, when the subject will be considered.

PROPOSED REGULATIONS AS TO THE PRESENTATION, READING AND DISCUSSION OF PAPERS AT CONVENTIONS.

Members of the Society to be informed that papers submitted for reading at any Annual Convention should be in the hands of the Secretary at least 40 days before the date of such Convention.

Members also to be informed that papers which are not received in time to conform to this rule can only take the chance of being presented to the Convention after the reading and discussion of the papers which have been so submitted.

When papers are received in accordance with this regulation, and have been accepted by the committee for presentation, the Secretary to have concise abstracts made of each paper, and to mail these abstracts to each member of the Society, with a request that discussion be prepared, and also that each member who is willing and desirous to take part in the discussion shall so inform the Secretary. More detailed information as to a particular paper may be furnished to members desiring to discuss it.

In preparing the programme for the Convention, the papers to be classified, so that as far as practicable definite classes of subjects may be considered at the same time, and notices of this classification, and of the times when particular subjects are to be considered, to be prepared and posted. The discussions upon particular subjects and papers to be opened by members, in an order to be designated by the Chairman of the Convention, and afterwards the discussion to be general.

A committee, to be appointed by the Board, of members who are to be present at the Convention, which committee will aid the Secretary in arrangements for the presentation and discussion of papers, and in perfecting other requisite details for the Convention.

A large number of replies to these circulars, received from the members of the Society, will be presented at the Annual Meeting, and the whole subject may be considered.

MEETINGS OF THE SOCIETY.

The regular meetings of the Society during the past year have been well attended. The Board is glad to say that the number of members of the Society not resident in New York who have found it possible to be present at these meetings has been large. An experiment has been tried, at the suggestion of some of the members, of providing, on the occasion of the meetings on the first of each month, a collation after the meetings, in order that pleasant opportunity for conversation should be given. The result of the experiment seems to be satisfactory. These collations are, of course, not paid for from funds of the Society, but are provided by the voluntary subscription of resident members.

RECORD OF MEETINGS.

Since the Convention, the Secretary has prepared a record of each meeting, stating the business done, and also giving an abstract of the papers read. These records have been printed and issued to all the members of the Society. This has been done to supply a want which

has been much felt of a means for giving to the members generally, information as to what is done at the meetings, and also for giving abstracts of the papers read, that our members might be made acquainted with the subjects considered, and that they might have the opportunity of discussing these subjects. It has been found impossible to issue the ordinary transactions of the Society with the regularity of a monthly magazine. The Society is dependent upon its members for the papers published in the Transactions. The management is unable always to secure the issue of these papers with absolute regularity, and while the twelve numbers can be issued in a year, and the proper number of pages can be prepared, it is believed that the issue of the records of meetings referred to will enable the direction to increase the value of the Transactions, and at the same time give to the members the information which heretofore has been only obtainable from the monthly number. The experiment has already been successful in securing the presentation, through these abstracts, of considerable discussion. More detailed information, as to the contents of any paper than can be properly condensed in an abstract, can always be given to persons desiring to discuss it.

TRANSACTIONS.

The issue of Transactions has been alluded to above. All the earlier numbers are now in stock, and can be supplied to any persons desiring to complete their volumes. The demand for early numbers has warranted the Direction in having those reprinted which were out of print.

HOUSE OF THE SOCIETY.

The value to the Society of the ownership of its House becomes more evident every year. Situated where it is convenient as regards ease of access, both from the business parts of the city and from the residence portion; easily approached by the various lines of street ways in its immediate vicinity, and particularly convenient to non-resident members, on account of its proximity to many hotels, it has been, during the past year, used very much more than have the rooms of the Society at any previous time. The Library is increasing constantly, and the accommodation always prepared for the use of the House by members, either for reading, correspondence or consultation, seems to be highly valued. Members often meet here other engineers from all parts of the world.

The Board of Direction reminds the members that this House has been bought, and that all the money which has been so far paid for it has been provided, entirely apart from the funds of the Society. No money has been expended upon the property, except that which has been voluntarily subscribed for the building fund. The state of this fund and the total amount of subscriptions are shown by the Treasurer's report. The property is substantially half paid for; every payment,

reducing the mortgage upon the House, reduces the rental which the Society has to pay, and the value to the Society of subscriptions to this fund, and the desirability of additional subscriptions, is particularly commended by the Board to the attention of members. A number of the subscriptions made so far have been by persons not members of the Society, but interested more or less generally in engineering. It is believed that if our members would commend this subject to the attention of such persons, the fund might be greatly increased.

THE FELLOWSHIP FUND.

But one subscription has been received during the past year to the Fellowship Fund. The income of this fund is devoted to the publications of the Society. The election as a Fellow gives to gentlemen, not otherwise connected with the Society, the advantage of receiving its publications and of participating in all the privileges of the Society except the right to vote. An increase in the number of Fellows is desirable, and this form of association with the Society may be found particularly agreeable to many gentlemen who might not desire or be eligible for other classes of membership.

THE LIBRARY.

There have been 1 410 additions to the Library of the Society during the past year, and there are at present over 15 000 separate numbers in the Library. Its value as a library of reference is increasing constantly, and the attention of our members is again particularly called to the great aid which may be given to engineers by additions to this Library. Early and current reports upon all engineering works, municipal, railway and others, are earnestly desired. Some of the recent valuable additions to the Library, presented by members, have been, a complete set of the reports of the Baltimore and Ohio Railroad; the first 66 volumes of the "Annales des Ponts et Chaussées," substantially making the volumes of the Society complete in regard to these important papers; a large collection of reports and documents upon water works, and a collection of valuable books upon architecture. These are referred to as showing the interest exhibited by some of our members in this direction. All of these contributions except one have been kindly forwarded from a distance.

THE COMMITTEE ON UNIFORM STANDARD TIME.

During the past year the Chairman of the Committee of this Society on Uniform Standard Time participated as one of the delegates at the International Conference held in Washington, by invitation of the Government of the United States, at which the representatives of 26 nations were present. This conference recommended the establishment

of a definite single prime meridian for use by all nations, and also recommended the adoption of the 24-hour system for the notation of time. Circulars issued by this Committee to the officials of the railways throughout the country have resulted in a very decided expression of opinion favorable to the general adoption of this system of time notation. The Committee will make a further report at the Annual Meeting.

THE COMMITTEE ON THE PRESERVATION OF TIMBER.

The Committee on the Preservation of Timber has secured a large amount of valuable information which, it is understood, will be presented at this meeting, and the results of which will probably be printed in our Transactions.

THE COMMITTEE ON A UNIFORM SYSTEM FOR TESTS OF CEMENT.

The Committee on a Uniform System for Tests of Cement has been actively engaged during the year in consideration of the subject committed to it, and a report has been prepared which will be submitted at this meeting for consideration and discussion.

AMENDMENT TO THE CONSTITUTION.

The following proposed amendment to the Constitution has been regularly submitted and sent to the members. It will be in order for discussion at this meeting, and with any amendments approved by a majority vote of this meeting will afterwards be voted upon by letter ballot:

Proposed Amendment to Article XXII.

Add at end of Article as follows:

Any member of the Society, not in arrears for dues, may compound for future annual dues by the payment of Two Hundred and Fifty Dollars.

Provided, however, that each person duly elected a Member shall pay the entrance fee and also the annual dues for the current year of his election.

Provided, also, that any Member desiring to compound for future annual dues shall have paid the annual dues for the current year before the compounding sum may be available.

Provided, also, that in addition to the sum provided for compounding dues, there shall be paid by each compounding member, resident within fifty miles of the Post Office in the City of New York, the sum of Ten Dollars per year for five years after compounding.

Should a resident member become non-resident at any time during the five years after compounding, he shall be relieved from the payment of such annual sum during the time of non-residence.

Should a non-resident member become resident at any time within five years after compounding, he shall be liable to the annual payment

of Ten Dollars for each year of residence up to five years after compounding.

Members compounding shall sign an agreement that they will be governed by the Constitution and By Laws of the Society as they are now formed or as they may be hereafter altered, amended or enlarged; and that in case of their ceasing to be members from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.

AMENDMENT TO THE BY-LAWS.

The nineteenth section of the By-Laws has been amended during the past year, and now reads as follows :

SECTION 19.—A nomination or proposal shall be presented at the next regular meeting of the Board of Direction following its receipt; the Board of Direction shall thereupon send to all members of the Society a notice that such person is a candidate for election. Not less than thirty days thereafter the Board shall consider the application, and if approved and the applicant (if for admission as Member, Associate or Junior) classed with his consent, a day shall be fixed for the ballot to be canvassed, which shall be at a regular meeting of the Society, not less than twenty-five days thereafter.

THE NORMAN MEDAL.

The Norman Medal for 1883 was awarded to the Papers Nos. CCXLVIII and CCLVIII, "On the Increased Efficiency of Railways for the Transportation of Freight," and "How can Railways be made more Efficient in the Transportation of Freight?" by William P. Shinn, M. Am. Soc. C. E. The Board of Censors to award this medal for the past year will present the report of award at this meeting.

THE ROWLAND PRIZE.

The Rowland Prize, instituted by the Society, was awarded for the year 1883 to Paper No. CCLXIII, "Rebuilding the Monongahela Bridge," by G. Lindenthal, M. Am. Soc. C. E. The Committee appointed to make the award of this prize for the past year has its report ready for presentation at this meeting.

The sum of \$1 000 to constitute a permanent fund, the income from which will pay this prize, has been contributed to the Society by Mr. T. F. Rowland, M. Am. Soc. C. E.

BADGE.

At the last annual meeting a resolution was passed requesting the Board of Direction to take action in reference to a Society badge. The

following circular letter issued by the Board on September 30, 1884, gives a statement of what has been done in reference to this subject:

Sir:

I am instructed by the Board of Direction of the American Society of Civil Engineers to say to you that:

At the Annual Meeting of the Society in January, 1884, at which 104 members were present (in addition to Associates, Juniors and Fellows), the following resolution was passed:

"That the Board of Direction have a badge prepared, which members of the Society shall wear at meetings, and which may be worn at other times."

The Board took action in accordance with this resolution, adopting a design for a badge presented by a Special Committee of Members of the Society (none of the committee being members of the Board).

Three hundred and twenty-two (322) badges of the adopted design have been bought and are in use.

The design, however, does not meet the approval of a number of our members, and communications addressed to the Board of Direction have been received from ninety-three (93) members, requesting that the "question of the adoption of a badge, and that of a design for the same, be opened before the Society at large, that each and every member may vote on the questions:

"1. A badge—Yes; or a badge—No.

"2. The design—Yes; or the design—No.

"That if the first question is decided in the affirmative, and the second in the negative, other designs be obtained; but before any be adopted, such adoption of the device be sanctioned by general vote of the members, as may be provided by the Constitution or By-Laws for such cases."

A question that would be raised, should the Board act in accordance with these requests, has been carefully considered. It is whether the Board of Direction shall order a general vote by letter ballot upon a resolution already regularly passed at an Annual Meeting of the Society. This is a delicate question of legislative order. To direct such a vote would establish an important precedent.

The ordinary legislative method would seem to be that, for the purpose of securing a reconsideration of a resolution passed at the last Annual Meeting, a motion to that effect should be made at the approaching Annual Meeting by one of the majority voting on the original motion.

The Board of Direction does not consider it proper or wise, therefore, to order a general vote by letter ballot under these circumstances.

MEMBERSHIP TABLES.

The following tables show the changes and additions during the year in the various classes of membership:

On January 1st, 1884, the date of the last report, the membership in the Society was:

Honorary Members, resident...	2	Non-resident....	7	Total...	9
Corresponding Members.....		"	.... 3	"	... 3
Members, resident.....	122	"	....467	"	589
Associates, "	11	"	.... 20	"	31
Juniors, "	14	"	.... 53	"	67
					—687
Making resident.....	149	Non-resident....	550		
Total.....					699

Fellows, 66, of whom 8 Members and 1 Honorary Member are included above, leaving.....	57
Total Members and Fellows.....	756

Subscribers to the Building Fund, 131, of whom 88 are entered in one or other of the above classifications and 4 deceased, leaving.	39
Total connected with the Society January 1st, 1884.....	795

At the present date, January 1st, 1885, the membership is:

Honorary Members, resident...	2	Non-resident....	8	Total...	10
Corresponding Members.....		"	.... 3	"	... 3
Members, resident.....	130	"	....527	"	657
Associates, "	12	"	.... 22	"	34
Juniors, "	16	"	.... 61	"	77
					—768
Making resident.....	160	Non-resident....	621		
Total.....					781

Fellows, 66, of whom 8 Members and 1 Honorary Member are included above, leaving.....	57
Total Members and Fellows.....	838

Subscribers to the Building Fund, 137, of whom 93 are entered in one or other of the above classifications and 4 deceased, leaving.	40
Total connected with the Society January 1st, 1885.....	878

The additions during the past year to the several classes of Society membership have been:

Honorary Member qualified.....	1
Members qualified.....	82
Associates qualified.....	5
Juniors qualified.....	20
Fellow qualified.....	1

Total additions to the several classes of membership.....109

Subscribers to the Building Fund, 7, 5 of whom are otherwise connected with the Society; leaving not otherwise connected with the Society.....	2
--	---

Total additions.....111

The decrease during the year in the several classes of membership has been:

Members....Died 9..Resigned 5.....	14
Associates..... " 1..Transferred to Member 1.....	2
Juniors....Died 1..... " " " 9.....	10
Fellows ... " 1.....	1

Totals.....Deaths 11, Resignations 6, Transferred 10..... 27

Also 1 former subscriber to the Building Fund became a member. 1

28

There has thus been an addition of 111 to the various classes of membership and subscribers to the Building Fund, and a decrease of 28, making the actual net additions during the year 83 in number.

On January 1st, 1884, there were, as stated in the last Annual Report, 9 proposals pending; 127 proposals have been received during the year; 1 candidate has been elected Honorary Member; 69 candidates have been elected Members, of whom 1 was transferred from Associate, and 9 from Junior; 5 candidates have been elected Associates; 20 candidates have been elected Juniors.

1 person has qualified during the year as Honorary Member; 82 persons have during the year qualified as Members; 5 have qualified as Associates; 20 have qualified as Juniors; 1 has qualified as Fellow; 7 candidates elected during the year as Members, and 1 Associate, and 1 Junior have not yet qualified; there are 18 proposals now pending.

Twenty meetings of the Society were held during the year, one of which was the Annual Meeting, held in New York, January 16th and 17th, and another the Annual Convention, held in Buffalo, New York, June 10th to 13th; all the sessions of the Convention, including the

business meeting, being counted as one meeting of the Society. Meetings have been held on the first and third Wednesday of each month, except July and August.

Twenty-seven meetings of the Board of Direction have been held during the year.

Reports made during the year have been as follows:

By the Board of Direction: The Annual Report.

By the Finance Committee: Annual Report on the Finances of the Society; Quarterly Reports to the Board of Direction.

By the Library Committee: Regular Monthly Reports on the Library and on Publications.

By the Secretary: Monthly Reports to the Board of Direction; Occasional Reports on Current Business.

By the Treasurer: The Annual Report of the Treasurer; Monthly Reports to the Board of Direction.

By the Committee on Uniform System for Tests of Cement: 2 Reports.

By the Committee on Preservation of Timber: 2 Reports.

By the Committee on Uniform System for Standard Time: 2 Reports.

By the Nominating Committee: 1 Report.

By the Committee in Reference to the International Inventions Exhibition in London, 1885: 1 Report.

The Society has lost by death, during the term covered by this report, nine Members, Messrs. C. Vandervoort Smith, Past Director of the Society; John Avery, Charles L. McAlpine, John Griffen, Samuel H. Shreve, Gabriel Jordan, Charles A. Smith, Isaac Newton and Edward Yorke; one Junior, William M. Allaire; and one Fellow, Daniel L. Wells.

Respectfully submitted,

JOHN BOGART,

Secretary.

REPORT OF THE TREASURER

FOR THE YEAR ENDING DECEMBER 31ST, 1884.

RECEIPTS.

Balance on hand December 31, 1883 :

Building Fund	\$925.46	
Fellowship Fund	1 217.38	
General Fund	4 859.15	
	<hr/>	\$7 001.99

Receipts during year :

Entrance Fees	\$2 730.00
---------------------	------------

Current Dues :

From 91 Resident Members	\$2 208.50
" 396 Non-resident Members	5 647.96
" 8 Resident Associates	112.50
" 20 Non-resident Associates	190.00
" 17 Resident Juniors	247.50
" 45 Non-resident Juniors	435.00
	<hr/>
	\$8 841.46

Past Dues :

From 10 Resident Members.....	\$429.16
" 35 Non-resident Members.....	561.00
" 1 Resident Associate.....	15.00
" 1 Non-resident Associate.....	10.00
" 1 Resident Junior.....	15.00
" 2 Non-resident Juniors.....	20.00
	<hr/>
	1 050.16

Dues for year beginning January 1st, 1885 :

From 23 Resident Members	\$575.00	
" 113 Non-resident Members	1 700.00	
" 2 Resident Associates	30.00	
" 2 Non-resident Associates	20.00	
" 1 Resident Junior	15.00	
" 8 Non-resident Juniors	80.00	
	<u>2 420.00</u>	
		<u>12 311.62</u>

Sales of Publications.....	663.79
Certificates of Membership.....	124.25
Advertisements.....	103.00
Interest on Fellowship Fund Bonds.....	420.00
" Savings Bank Deposit.....	32.04
" Norman Medal Fund Bond.....	70.00
" Railroad Stock.....	77.62
" Bonds purchased during year.....	375.00
	<hr/>
Subscriptions to Building Fund.....	974.66
Fellowship Fees.....	620.00
Other sources.....	150.00
	1.78

From Savings Bank	17 679.10
From T. F. Rowland, M. Am. Soc. C. E., creating Rowland Prize Fund	285.53
	1 000.00

\$25 966.62

JANUARY PROCEEDINGS.

47

DISBURSEMENTS.

Interest on Mortgage.....	\$800.00	
Taxes.....	492.50	
Publications.....	4 521.24	
Stationery and Printing.....	754.71	
Postage.....	797.24	
Library.....	595.46	
Salaries.....	3 000.00	
Convention and Annual Meeting.....	844.41	
Janitor, House Supplies, Fuel, Water and Gas.....	1 500.01	
Certificates of Membership.....	55.80	
Insurance.....	62.50	
Norman Medal and Rowland Prize.....	131.25	
Other expenditures.....	332.13	
Finance—Treasurer's Books.....	340.00	
Work of Committees.....	412.50	
		<u>\$14 639.75</u>
Payments from Building Fund.....		1 119.43
Transferred to Savings Bank.....		32.04
Purchased during year 9 bonds, costing.....	\$10 598.75	
Sold during year 5 bonds for.....	5 400.25	
		<u>\$5 198.50</u>
Cash expended for 4 bonds now on hand.....		\$5 198.50
NOTE.—One of these bonds belongs to the Fellowship Fund; one to Rowland Prize Fund, and two to the General Society Fund.		
Balance on hand—Building Fund.....	\$426.03	
General “.....	4 550.87	
		<u>4 976.90</u>
		<u>10 175.40</u>

\$25 966.62

The funds of the Society are as follows :

Fellowship Fund :

Eighty-six subscriptions to December 31, 1883.....	\$9 050.00
Premium and accumulated interest December 31, 1883.	1 903.69
	<hr/>
Fund on hand December 31, 1883.....	\$10 953.69
One subscription during 1884.....	150.00
Interest received during 1884.....	420.00
	<hr/>
	\$11 523.69
Expended for publications during 1884.....	818.37
	<hr/>
	<u>\$10 705.32</u>

The present investment of the Fund is :

Eight Pennsylvania Railroad six per cent. Bonds, cost.	\$9 889.32
Deposit in Seamen's Bank for Savings.....	816.00
	<hr/>
	<u>\$10 705.32</u>

Norman Medal Fund :

One Certificate Croton Aqueduct Stock, New York City.....	\$1 000.00
	<hr/>

Building Fund :

Receipts previous to January 1, 1884.....	\$16 897.00
“ during 1884.....	620.00
	<hr/>
	<u>\$17 517.00</u>

Expended :

For Legal Services, Circulars, &c.....	\$355.03
For Improvements on Property.....	2 735.94
Payments on Purchase.....	14 000.00
On hand December 31, 1884.....	426.03
	<hr/>
	<u>\$17 517.00</u>

Rowland Prize Fund :

One Pennsylvania Railroad General Mortgage 6 per cent. Bond, cost.....	\$1 222.50
	<hr/>

General Investment :

10 Shares New York Central and Hudson River Railroad Stock.....	\$1 000.00
1 Consolidated Certificate New York Central and Hudson River Railroad Stock.....	35.00
2 Pennsylvania Railroad General Mortgage 6 per cent. Bonds, cost.....	2 445.00
	<hr/>
	\$3 480.00
	<hr/>

Respectfully submitted,

J. JAMES R. CROES,
Treasurer.

REPORT OF THE COMMITTEE ON FINANCE,

PRESENTED AND ACCEPTED AT THE ANNUAL MEETING, JANUARY 21, 1885.

The Finance Committee has the honor to report that, having audited all the bills that have been paid by the Treasurer during the past year, they have found that each bill has been charged to its proper fund, and that the several sums have not exceeded the amounts appropriated by the Board of Direction for the purposes specifically mentioned. Also that the Committee has, at the end of the year, carefully examined all of the assets and liabilities of the Society, and has found that the reports of the Secretary and Treasurer give a correct account of the same.

Respectfully submitted,

W. H. PAINE,
G. S. GREENE, JR.,
WM. R. HUTTON,
Finance Committee.

LIST OF PUBLICATIONS AND PAPERS RECEIVED FOR LIBRARY.

APPENDIX TO ANNUAL REPORT OF THE BOARD OF DIRECTION,
JANUARY 21ST, 1885.

The following papers are contributed to the Society, or are received in exchange for Transactions :

American Architect and Building News.. ..WeeklyBoston.
American Engineer..... "Chicago.

American Gas Light Journal.....	Semi-Monthly..	New York.
Annales des Travaux Publics.....	Monthly	Paris.
Army and Navy Journal.....	Weekly.....	New York.
Builder	"	London.
Building and Engineering News.....	"	"
Bulletin American Iron and Steel Association.....	Semi-Monthly..	Philadelphia.
Bulletin du Canal Interocéanique.....	"	Paris.
City Record.....	Daily.....	New York.
Commissioner of Patents' Journal.....	Semi-Weekly..	London.
Der Civilingenieur.....	Monthly	Leipsig.
Deutsche Bauzeitung.....	Weekly.....	Berlin.
Engineer.....	"	London.
Engineering.....	"	"
Engineering and Mining Journal.....	"	New York.
Engineering News and American Contract Journal.....	"	"
Genie Civil.....	"	Paris.
Industrie Zeitung.....	Bi-Monthly	Riga.
Industrial America.....	Weekly.....	New York
Iron.....	"	London.
Iron Age.....	"	New York.
Journal of the Association of Engineering Societies.....	Monthly	"
" of Artillery and Military Engineering.....	"	Vienna.
" of Society of Arts.....	Weekly.....	London.
" of Gas Lighting.....	"	"
Manufacturer and Builder.....	Monthly	New York.
Manufacturer and Iron World.....	Weekly.....	Pittsburgh.
Magazine of American History.....	Monthly	New York.
Mechanical News.....	Semi-Monthly..	"
Norsk Teknisk Tidsskrift.....	Monthly	Christiania.
Nouvelles Annales de la Construction.....	"	Paris.
Portefeuille Economique des Machines.....	"	"
Record of Scientific Literature.....	"	New York.
Railroad Gazette.....	Weekly.....	"
Railway Age.....	"	Chicago.
Railway Review.....	"	"
Railway World.....	"	Philadelphia.
Reportorium der Technischen Literatur.....	"	Leipsig.
Revue Générale des Chemins de fer.....	Monthly.....	Paris.
Sanitary Engineer.....	Weekly.....	New York.
Science.....	"	Cambridge.
Scientific American.....	"	New York.
Scientific American Supplement.....	"	"
Teknisk Tidsskrift.....	Monthly	Stockholm.
Techniker.....	Semi-Monthly..	New York.
Telegraph Journal and Electric Review.....	"	London.
The Locomotive.....	Monthly.....	Hartford.
Van Nostrand's Magazine.....	"	New York.
Zeitschrift fur Baukunde.....	Quarterly	Munich.
Zeitschrift fur Bauwesens.....	"	Berlin.

The following are subscribed for :

American Bookseller.....	Semi-Monthly..	New York.
American Library Journal.....	Monthly.....	"
Bookseller.....	"	London.
Publishers' Weekly.....	Weekly.....	New York.
U. S. Official Postal Guide.....	Monthly	Boston.

The Society has received during the year, in exchange for the "Transactions," official publications of the following associations, in many instances for preceding years :

Aeronautical Society of Great Britain.....	London.
Academy of Sciences.....	Washington.
Akademie des Bauwesens.....	Berlin.
American Institute of Architects.....	New York.
American Institute of Mining Engineers.....	"
American Iron and Steel Association.....	Philadelphia.
American Society of Mechanical Engineers.....	New York.
Annales de Construcciones Civiles y de Minas.....	Lima.
Annales des Ponts et Chaussées.....	Paris.
Argentine Scientific Society.....	Buenos Ayres.
Association of Civil Engineers.....	Lisbon.
Astor Library.....	New York.
Austrian Society of Engineers and Architects (Two Publications).....	Vienna.
Boston Public Library.....	Boston.
Boston Society of Civil Engineers.....	"
Canadian Institute.....	Toronto.
Civil Engineers' Society of St. Paul.....	St. Paul.
Civil Engineers' Club of Cleveland.....	Cleveland.
Die Administration der "Mittheilungen".....	Vienna.
Engineers' Club of Philadelphia.....	Philadelphia.
Engineers' Club of St. Louis.....	St. Louis.
Engineer Department, U. S. A.....	Washington.
Engineers' Society, Western Pennsylvania.....	Pittsburgh.
Franklin Institute Journal.....	Philadelphia.
Imperial School.....	Moscow.
Imperial Technic Society of Russia.....	St Petersburg.
Imperial University.....	Tokio.
Institution of Civil Engineers.....	London.
" " of Ireland.....	Dublin.
" of Engineers and Shipbuilders of Scotland.....	Glasgow.
" of Mechanical Engineers.....	London.
Iron and Steel Institute.....	"
Massachusetts Institute of Technology.....	Boston.
McGill University, Department of Science.....	Montreal.
Mechanics' Institute.....	San Francisco.
Midland Institute, Mining, Civil and Mechanical Engineers.....	Barnsley, Eng.
Military Service Institution of the United States.....	Governor's Island, N.Y.
Mining Institute of Scotland.....	Hamilton.
New York Meteorological Observatory.....	New York.
North of England Institute of Mining and Mechanical Engineers.....	Newcastle-on-Tyne.
Rensselaer Society of Engineers.....	Troy.
Riga Technical Society.....	Riga.
Royal United Service Institution.....	London.
School of Mines, Columbia College.....	New York.
Seismological Society of Japan.....	Tokio.
Smithsonian Institution.....	Washington.
Society of Arts.....	London.
Society of Civil Engineers.....	Paris.
Society of Engineers.....	London.
Society of Engineers and Architects.....	Cologne.
Society of Engineers and Architects of Hungary.....	Budapest.
" " " of Saxony.....	Dresden.
" " " ".....	Hanover.
Stevens Institute of Technology.....	Hoboken.

Swedish Society of Engineers.....	Stockholm.
Thayer Scientific School, Dartmouth College.....	Hanover.
Thomson Civil Engineering College, Indian Engineering.....	Roorkee.
United States Coast and Geodetic Survey.....	Washington.
“ Geological Survey.....	“
“ Light House Board.....	“
“ Military Academy.....	West Point.
“ Naval Institute... ..	Annapolis.
“ Naval Observatory.....	Washington.
“ Ordnance Department.....	“
“ Patent Office.....	“
University of Michigan.....	Ann Arbor.
Western Society of Engineers.....	Chicago.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

	Date of Election.
ARCHIBALD, PETER SATHER... Chief Engineer Intercolonial Ry., Moncton, N. B., Canada.	Jan. 7, 1885.
BABCOCK, HENRY NASH..... U. S. Engineers' Office, New Haven, Conn.....	Sept. 3, 1884.
JARVIS, CHARLES MAPLES..... Chief Engineer, Berlin Iron Bridge Co., East Berlin, Conn.....	Jan. 7, 1885.
LAFON, THOMAS..... (Elected Junior March 3, 1875.) (Care of Mrs. Charles Young), 1058 Broad street, Newark, N. J.....	Nov. 5, 1884.
ORBISON, THOMAS WATSON.... Superintendent Hydraulic Power Co., Iron Mountain, Mich.....	Sept 3, 1884.
PHINNEY, HENRY WARD BEECHER. 170 East 111th street, New York City.....	Jan. 7, 1885.

JUNIOR.

BOOTH, WILLIAM FERRIS..... Poughkeepsie, N. Y.....	Jan. 7, 1885.
--	---------------

CHANGES AND CORRECTIONS.

MEMBERS.

ABBOT, FREDERIC V.....	1st Lieut. Corps of Engineers, U. S. A., Charleston, S. C.
APPLETON, THOMAS.....	P. O. Box 2008, Kansas City, Mo.
BAILEY, THOMAS N.....	Capt. Corps of Engineers, U. S. A., Whitestone, N. Y.

- BALDWIN, THOMAS W.....Hotel del Monte, Monterey Co., Cal.
 BARNARD, AUGUSTUS P.....(Care of D. Van Nostrand), 23 Murray street,
 New York City.
 BAXTER, GEORGE S.....Assistant Treasurer, Northern Pacific R. R., St.
 Paul, Minn.
 BRUNER, DANIEL P.....Ledger Building, Room 2, Philadelphia, Pa.
 CLARKE, THOMAS C.....Union Bridge Co., Welles Building, Room 713,
 New York City.
 CUNNINGHAM, DAVID W.....Wellesley Hills, Norfolk Co., Mass.
 CURTIS, WENDELL R.....U. S. Engineers' Office, Fernandina, Fla.
 DOANE, WALTER A.....(Care of James Ross), Canadian Pacific Ry.,
 West End of Track, Winnipeg, Manitoba,
 Canada.
 DORAN, FRANK C.....Pico House, Los Angeles, Cal.
 DORSEY, EDWARD B.....Consulting Engineer to the American Ex-
 hibition, London, 1886, 7 Poultry, London,
 E. C., England.
 ELLIS, NATHANIEL W.....593 Union st., Manchester, N. H.
 FORSYTH, ROBERT.....Spang Steel and Iron Co., Sharpsburg, Pa.
 GATES, HORACE D.....Lewis, Lander Co., Nevada.
 GOLAY, PHILIP.....Vevay, Indiana.
 GOTTLIEB, ABRAHAM.....Major Block, Room 75, Chicago, Ill.
 GREENE, BENJAMIN H.....Chief Engineer, Gulf and Ship Island R. R.,
 McComb City, Miss.
 HARRIS, WILLIAM P.....Superintendent, Baltimore and Ohio R. R.,
 West of Cumberland, Cumberland, Md.
 HEGEMAN, WILLIAM W.....(Care of O'Brien & Clark), Yonkers, N. Y.
 HEUER, WILLIAM H.....Capt. Corps of Engineers, U. S. A., 63 Caron-
 delet st., New Orleans, La.
 LEVERICH, GABRIEL.....22 Sands st., Brooklyn, N. Y.
 LINVILLE, JACOB H.....3314 Arch st., Philadelphia, Pa.
 LOW, GORHAM P.....Gloucester, Mass.
 MACDONALD, CHARLES.....Union Bridge Co., Welles Building, 18 Broad-
 way, Rooms 713-719, New York City.
 MCCLINTOCK, WILLIAM H.....Engineer, Southern Division Louisville and
 Nashville R. R., Montgomery, Ala.
 McDONALD, HARRY P.....N. E. Cor. Fifth and Market sts., Louisville, Ky.
 MICHAELIS, OTHO E.....Capt. Ordnance Corps, U. S. A., Watervliet
 Arsenal, West Troy, N. Y.
 MOORE, CHARLES E.....Bridge Inspector, Wabash, St. Louis and Pacific
 Ry., Moberly, Mo.
 PAINE, CHARLES.....Gen. Supt. New York, Pennsylvania and Ohio
 Ry., Cleveland, Ohio.
 PARTRIDGE, JOHN A.....La Pierre House, cor. Tenth and E sts., N. W.,
 Washington, D. C.
 RAFTER, GEORGE W.....Civil and Sanitary Engineer, Water Engineers'
 Office, 32 City Hall, Rochester, N. Y.
 SAFFORD, EDWARD S.....312 Madison avenue, Baltimore, Md.

- SEARLES, WILLIAM H. Merchants' Bank Building, Room 35, Cleveland, Ohio.
- SITES, WILMON W. C. Engineer, State Board of Assessors, Fuller Building, Rooms 74 and 75, Jersey City, N. J.
- SMITH, CHARLES C. 530 Olive st., St. Paul, Minn.
- SMITH, W. HARRISON. Assistant Engineer, Northern Central R. R., 414 W. Church st., Elmira, N. Y.
- VAUGHAN, FREDERICK W. (Care of E. O. Saltmarsh, Supt.), Pensacola, Fla.
- WALLING, HENRY F. 9 Pemberton Square, Boston, Mass.
- WURTELE, ARTHUR S. C. 25 Niagara Square, Buffalo, N. Y.
- YONGE, SAMUEL H. 1415 Washington ave., St. Louis, Mo.

JUNIORS.

- BREITHAUPT, WILLIAM H. 1424 Washington ave., St. Louis, Mo.
- CONNETT, ALBERT N. Delight, Ellsworth Co., Kansas.
- YATES, PRESTON K. Tarrytown, N. Y.
- YOUNG, HERBERT A. Chief Engineer, Toledo, Cincinnati and St. Louis R. R., Toledo, Ohio.

DEATHS.

- JERVIS, JOHN B. Elected Honorary Member, December 2d, 1868; Elected Fellow, March 19th, 1870; died January 12th, 1885.
- SICKELS, THEOPHILUS E. Elected Member, February 21st, 1872; died February 4th, 1885.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—February, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

FEBRUARY 4, 1885.—The Society met at 8 p. m., President Frederic Graff in the Chair; John Bogart, Secretary. The death on February 3d of Theophilus E. Sickels, M. Am. Soc. C. E., was announced. The Paper by E. Sweet, M. Am. Soc. C. E., on the Radical Enlargement of the Artificial Waterway between the Lakes and the Hudson River, was discussed by Messrs. E. L. Corthell, Edward P. North, Willard S. Pope, O. M. Poe, T. C. Keefer, Simon Stevens, A. P. Boller and M. M. Drake.

FEBRUARY 18, 1885.—The Society met at 8 p. m., Vice-President G. S. Greene, Jr., in the Chair; John Bogart, Secretary. The discussion on the Paper on the Radical Enlargement of the Artificial Waterway between the Lakes and the Hudson River was continued by Messrs. E. S. Cheshbrough, Walton W. Evans, T. C. Clarke, N. M. Edwards, William E. Merrill, John D. Van Buren, Jr., D. Farrand Henry, O. Chanute, C. Herschel, J. Nelson Tubbs, Robert L. Harris, Theodore Cooper, F. Collingwood and E. Sweet.

OF THE BOARD OF DIRECTION.

FEBRUARY 11, 1885.—Applications were considered. A communication was directed to be sent to the members of the Committee on a Uniform System for Tests of Cement in relation to the Majority and the Minority Reports of that Committee. Financial business was

transacted. The presentation of \$50, for purchase of books for the library, by Hamilton Smith, Jr., M. Am. Soc. C. E., the recipient of the Rowland Prize for the past year, was acknowledged. Letters from members in arrears for dues were presented and action taken.

FEBRUARY 25, 1885.—Applications were considered. Letters from members in arrears were presented and action taken. A committee was appointed to consider the subject of the proposed reform in the Patent Office, and to report a recommendation whether it is best that the Society should take any action in the matter. Action was taken in accordance with the resolution of the Annual Meeting in reference to a committee to investigate the compressive strength of cement and the compression of cements and mortars, and the settlement of masonry.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—March, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

MARCH 4TH, 1885.—The Society met at 8 P. M., President Graff in the Chair; John Bogart, Secretary. The vote on the proposed amendment to the Constitution was canvassed as follows:

For the amendment.....	181
Against the amendment.....	28
Blank votes.....	3
Ballot not endorsed.....	1
Total votes received.....	213

This proposed amendment, having received an affirmative vote of two-thirds of all ballots cast, was declared duly adopted as an amendment to the Constitution of the Society. It reads as follows:

Add at end of Article XXII:

Any member of the Society, not in arrears for dues, may compound for the payment of all future annual dues, except as hereinafter provided, by the payment of Two Hundred and Fifty Dollars.

Provided, That all Resident members, or those who may hereafter become such, shall be and remain liable to the annual payment of the difference between the annual dues of Resident and Non-Resident Members, as the same now is, or may be established from time to time; but any member may at any time compound for the future payment of all annual dues of every nature and kind, by the payment of Seventy-Five Dollars in addition to the Two Hundred and Fifty Dollars hereinbefore provided for.

Provided, however, that each person duly elected a Member shall pay the entrance fee and also the annual dues for the current year of his election.

Provided, also, that any Member desiring to compound for future annual dues shall have paid the annual dues for the current year before the compounding sum may be available.

Members compounding shall sign an agreement that they will be governed by the Constitution and By-Laws of the Society as they are now formed, or as they may be hereafter altered, amended or enlarged; and that in case of their ceasing to be members from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.

All moneys thus paid in commutation of annual dues shall be invested as a permanent fund, the interest thereof only being subject to appropriation for current expenses.

The death of Mr. F. W. Merz, F. Am. Soc. C. E., and of Mr. Arba Read Haddock, Assoc. Am. Soc. C. E., were announced.

At the Annual Meeting, the following resolution was adopted:

Resolved, That the President be authorized to appoint a committee, consisting of five members, to confer with committees appointed by kindred societies, for the purpose of devising and considering a plan for creating a library for the general use of the organizations represented by the committees in conference; said plan to be reported to the Society for such action as may be desirable.

Under the provisions of this resolution, the President announced the appointment of the following committee: Messrs. William P. Shinn, Henry R. Towne, Thomas C. Clarke, M. N. Forney and George S. Morison.

The following letter, received since the last business meeting of the Society, was presented:

THE AMERICAN EXHIBITION IN }
LONDON, 1886. }
LONDON, Jan. 24th, 1885. }

JOHN BOGART, Esq.,

Sec'y Am. Soc. C. E.:

DEAR SIR,—Since my last letters to you, I have informally heard from and seen the representatives of many societies, corporations, etc., who offer to co-operate most cordially with the Executive Council of this Exhibition, in making agreeable the visit of those members of our Society who may accept the invitation contained in my last letter, viz.: to hold our annual summer convention next year in London. At this distant period nothing would be gained by making a definite programme, as time would necessarily make many changes in it, but enough has been sketched out to warrant me in saying, that those who may accept the invitation will not regret it.

Yours most truly,

EDWARD BATES DORSEY, *M. Am. Soc. C. E.*,
Consulting Engineer to the Exhibition.

The presentation to the Society by Simon Stevens, Esq., of the Parliamentary Reports on the Caledonian Canal from 1803 to 1871; the Maps, Profiles and Drawings of the same canal; the Working Specifications of the Amsterdam Canal from 1865 to 1870, and the description of the North Sea Canal of Holland (subject to withdrawal by Mr. Stevens), was announced.

A paper on the Cantilever Bridge at Niagara Falls, by C. C. Schneider, M. Am. Soc. C. E., was read.

MARCH 18, 1885.—The Society met at 8 P. M., Vice-President G. S. Greene, Jr., in the chair; John Bogart, Secretary. A paper by D. J. Whittimore, Past President Am. Soc. C. E., on Roofing Slate, was read.

A paper by William P. Shinn, M. Am. Soc. C. E., in reply to a paper by E. Yardley, M. Am. Soc. C. E., in discussion of Mr. Shinn's previous papers on Railway Efficiency, was read.

OF THE BOARD OF DIRECTION.

MARCH 11, 1885.—Applications were considered. The following report was presented:

The Committee of the Board of Direction to which was referred the subject of the proposed Reform in the U. S. Patent Office, respectfully report:

From the papers submitted it appears that the proposed reform is to consist in the increased talent and ability of the Commissioner and the increase in number and efficiency of the examiners, these superior qualifications to be secured by larger compensation.

We believe that the promotion of reforms in the Government, so general in their character, are not included in the objects of our Association as given in Article II. of our Constitution, and if we are sometimes permitted to go beyond the strict letter of the law to promote some object of vital or very great importance to our whole profession, we are of opinion that the matter before us, however desirable its object may be, is not of the class referred to. We therefore recommend that the Society take no action in the matter.

The results sought are desirable in every respect, and members interested may well exert their personal influence to secure them.

THEO. COOPER, }
WM. R. HUTTON, } Committee.

The report was accepted and adopted by the Board. Communications from the members of the Committee on a Uniform System for Tests of Cement were presented, and the following resolution was adopted:

Resolved, That the Board request the Committee, as suggested by its

chairman, to consider the questions raised in the communications presented on this subject and report at as early a day as possible.

Financial business was transacted.

The following resolution was adopted :

Resolved, That, in the opinion of this Board, members whose principal business office and engineering residence is within fifty miles of the Post Office in the City of New York are Resident Members.

MARCH 25TH, 1885.—Applications were considered ; general business transacted.

ADDITIONS TO

LIBRARY AND MUSEUM.

- From Col. Julius W. Adams, Past President Am. Soc. C. E., Brooklyn, N. Y.:
- The following works on architecture:
 Studio d'Architettura Civile. Florence, 1727.
 Texier and Pullans Byzantine Architecture. London.
 W. E. Nesfield's Sketches in France and Italy. London.
 Gruner's Terra Cotta Architecture of Northern Italy. London.
 Construction en Brique. Louis Degar.
 Wick's Church Towers and Spires of England. Vols. I, II and III, with supplement to Vols. I and II.
 Architectura Domestica.
 The Ornamentist.
 Romanesque and Painted Architecture of France.
 Architectural Magazine. London. Complete in five volumes.
 Brongniart Traite Arts Ceramiques. Poteries. 3 volumes.
 Buckler's Abbey Church of St. Albans.
 Paley's Gothic Ornaments.
 Storer's Cathedral Churches of Great Britain 4 volumes.
 Freeman's History of Architecture.
 Salisbury Cathedral. Britton.
 Stuart's Architectural Dictionary. 3 vols.
 Nicholson's Architectural Dictionary. 4 vols.
 Careless Gothic Architecture.
 Britton's Ecclesiastical History of English Architecture.
 Egyptian Sarcophagii.
 Scott's Ornamentist.
- The following works on engineering subjects:
 Rodman's Experiments on Metals for Cannon, etc.
 Erweiterungsbauten der Rheinischen Eisenbahn. Coblenz.
 Long and Short Span Railway Bridges J. A. Roebling.
 Buchanan on Machinery. 2 volumes.
- Reports and Surveys Isthmus Canal. Darien.
 Reports and Surveys Isthmus Canal. Tehuantepec.
 Engineers' and Machinists' Assistant. Glasgow. 2 volumes.
 Hachette Elementary Treatise on Machines. 2 volumes.
 Transactions Institution of Civil Engineers. London. Vols. I and II.
 Brees' Railway Practice. 2 vols.
 Encyclopedia Technologique. 2 vols.
 Tredgold's Carpentry.
 Farey on the Steam Engine.
 Theory, Practice and Architecture of Bridges. 5 volumes and supplement.
 Hydraulic Motors. Paris. (Armengaud.)
 Boileau's Treatise on Running Water.
 Text of d'Arcy on Flow of Water.
 King's Memoir of Cost, &c., Croton Aqueduct.
 Schramke—Croton Aqueduct.
 Stuart's Naval Dry Docks of the United States.
 Submarine Propulsion. Labrousse.
 North Sea Canal of Holland.
 Practical Mechanics' and Engineers' Magazine. 8 vols.
 Screw Propeller, History and Treatise. J. Bourne.
 Early German Railway Construction.
 From American Institute of Mining Engineers, Dr. R. W. Raymond, Secretary, New York:
 The Law of the Apex. R. W. Raymond
 The Pocahontas Mine Explosion. J. H. Bramwell, S. M. Buck, E. H. Williams.
 Proceedings of the Fortieth Meeting, Philadelphia, Sept., 1884.
 The Separation of Strata in Folding. Fred. G. Bulkley.
 The Spence Automatic Desulphurizing Furnace. W. H. Adams.
 Notes on the Rhode Island and Massachusetts Coals. A. B. Emmons.
 The Desilverization of Lead by Electrolysis. N. S. Keith.

An Experiment in Coal Washing. Thomas M. Drown.

A New Pressure Filter. R. P. Rothwell.

The Determination of Phosphorus. Josef Westesson.

Notes on the Patio Process. C. A. Statefeldt. The Blake System of Fine Crushing. T. A. Blake.

Fire Clays and Fire Bricks in Sweden. N. Lilienberg.

Coal Mining in the Connellsville Coke Region of Pennsylvania. John Fulton.

The Vallejo Mines, Mexico. Richard E. Chism.

Note on Tantalite and Other Minerals Accompanying the Tin Ore in the Black Hills. C. A. Schaeffer.

Transactions, Vol. XII, June, 1883, to February, 1884.

From Canadian Institute W. H. Van der Smisssen, Corresponding Secretary.

Proceedings, October, 1884.

From W. W. Card, Pittsburgh, Penn.: Fifty copies of the Instruction Book of the Westinghouse Air Brake Company.

From Edwin Chadwick:

Address on House Drainage.

From Hon. William E. Chandler, Secretary of the Navy, Washington, D. C.:

Examples, Conclusions and Maxims of Modern Naval Tactics. By Commander Wm. Bainbridge-Hoff, U. S. N.

The Maritime Canal of Suez from its Inauguration, November 17, 1869, to the Year 1884. By Prof. J. E. Nourse, U. S. N.

Report of the Exhibits at the Crystal Palace Electrical Exhibition, 1882. By Ensign Frank Sprague, U. S. N.

Papers and Discussions on Engines, Boilers and Torpedo Boats.

Observations upon the Korean Coast, Japanese Korean Ports and Siberia made during a journey from the Asiatic Station to the United States through Siberia and Europe, June 3 to December 8, 1882. By Lieutenant B. H. Buckingham.

Papers and Discussions on Experiments with Steel.

From H. W. Clarke, Syracuse, N. Y.:

Report of the Commissioners on the Boundary Line between the States of New York and New Jersey.

A Manual of the Board of Supervisors of Onondaga County, N. Y., for 1884-5.

From Charles Colne, Secretary of the American Committee of the Universal Inter-oceanic Panama Canal Company.

The Panama Inter-oceanic Canal.

From E. L. Corthell, New York City:

Tehuantepec Ship Railway. The proposed Atlantic and Pacific Ship Railway. From the *London Times*, Aug. 21, 1884 (*several copies*).

From T. R. Crampton, London, Eng.:

On the Advantages of Constructing, Ventilating and Working Long Railway Tunnels with Three Separate Openings.

Creusement du Tunnel Sous-Marin Entre Calais et Douvres.

Crampton's Hydraulic System for Excavating the Channel Tunnel Automatically.

Observations Relating to the Laying of the First Submarine Cable Between Dover and Calais.

From J. James R. Croes, New York City:

Fourteenth Annual Report of the Trustees of the Water Works of Columbus, Ohio.

Thirteenth Annual Report of the Board of Water Commissioners to the City of New London, Conn., submitted to the Annual City Meeting, September, 1884.

Contract and Specifications of Column Foundations North of the Harlem River.

Contract and Specifications for Iron Draw Bridge Across the Harlem River.

Drawings for Column Foundations on Natural Ground, and on Made Ground.

From Joseph P. Davis, New York City:

The American Bell Telephone Company et. al. against The People's Telephone Company et. al., in Equity. Opinion, Wallace, J.

The American Bell Telephone Company et. al. vs. The People's Telephone Company et. al. Arguments of Hon. Lysander Hill and Hon. George F. Edmunds for the Defendants.

The American Bell Telephone Company et. al. vs. The People's Telephone Company et. al. with Arguments of J. J. Storrow and E. N. Dickerson. For Complainants.

The Speaking Telephone Interferences. Decisions of the Examiners-in-Chief. Cases A, B, C, D, E, F, G, H, I, J and No. 1.

From Patrick Doyle, Madras, India:

Tin Mining in Larut.

From Engineers' Club of Philadelphia; Howard Murphy, Secretary:

Proceedings, Vol. IV., No. 3.

List of Members, June 1884.

From Engineers' Society of Western Pennsylvania; Jas. H. Harlow, Secretary:

Natural Gas. By William Metcalf.

Will a Drowned Person Be Raised by the Discharge of a Cannon. By Jose De Cuento.

A Specimen of Cast Iron Pipe. By James H. Harlow.

Continuation of the Discussion of the Report of the Committee on Natural Gas.

From J. T. Fanning, C.E., Manchester, N. H.:

Homestead and Suburban Sewerage.

From Robert Fletcher, Hanover, N.H.:

Catalogue of Dartmouth College and the Associated Institutions for the Year 1884-1885.

From John C. Goodridge, Jr., New York City:

Beton Coignet and Goodridge System of Constructing and Repairing Railway and other Structures (*copies for distribution*).

From Samuel M. Gray, Providence, R. I.:

Proposed Plan for a Sewerage System and for the Disposal of the Sewage of the City of Providence.

From F. L. Griswold, Buenos Aires:

Our Merchant Marine. Address of John Roach, Esq., of New York, before the Committee on Post-Offices and Post-Roads.

Address of John Roach, of New York, before the Committee on Post-Offices and Post-Roads.

England's Maritime Policy; the Cause of the Decline of American Shipping. John Roach.

- Speech of Mr. John Roach before Convention of Shipwrecking and other Commercial Bodies at Boston, October 7, 1880.
- The American Carrying Trade. John Roach.
- A Plea for American Ships. An Address by John Roach.
- Benefits of the Tariff System, from the North American Review.
- Shall Americans Build Ships? John Roach.
- The International Review, containing paper on "What the Tariff Laws Have Done for Us." John Roach.
- From Messrs. Havestadt and Contag, Regierungs Baumeister, Berlin, Prussia:
- Project einer Neuen Oder-Weichsel-Verbindung. Mittelst eines Oder-Warthe Netze-Canals.
- Projekt einer Neuen Schlesisch-Märkischen Kanal-Verbindung Furstenberg, Berlin.
- Die Sundhäfen Dänemarks und Schwedens von Christian Havestadt. Regierungs Baumeister, Privat docent an der Königl. Technischen Hochschule zu Berlin. Aus Dem Berichte der Schinkel rein, 1878.
- Sud-West Kanal Berlin-Wannsee. Projekt einer Linie über Wilmsdorf.
- From Dr. Elisha Harris, Secretary State Board of Health, Albany, N. Y.:
- Fourth Annual Report of the State Board of Health of New York.
- From Gen. W. B. Hazen, Chief Signal Officer U. S. A.:
- The Effect of Wind-currents on Rainfall.
- From Wilhelm Hildenbrand, C. E., New York City:
- The underground haulage of coal by wire ropes. Including the system of wire rope tramways as a means of transportation for mining products. W. Hildenbrand, C. E.
- From Prof. Julius E. Hilgard, Superintendent U. S. Coast and Geodetic Survey, Washington, D. C.:
- The Late Attacks upon the Coast and Geodetic Survey.
- Report of the U. S. Coast and Geodetic Survey for 1883.
- From J. C. Hoadley, Boston, Mass.:
- Steam Engine Practice in the United States, 1884, by J. C. Hoadley.
- From William A. Ingham, Secretary Board of Commissioners Second Geological Survey of Pennsylvania:
- Maps and Charts of Cameron, Elk and Forest Counties.
- From the Institution of Civil Engineers, James Forrest, Secretary, London:
- Proceedings, Vol. LXXVIII.
- Brief subject Index. Vols. LIX to LXXVIII; Sessions 1879-'80 to 1883-'84.
- On the Electric Light. Alfred Richard Senett.
- The Comparative Merits of Engines for Pumping. William Edmund Rich.
- Abstracts of Papers in Foreign Transactions, and Periodicals.
- On the Antiseptic treatment of Timber. S. B. Boulton.
- The size and inclination of Sewers. Alfred E. White.
- Coaling at the Nine Elms Gas Works. Robert Morton.
- Lighthouse apparatus for dipping Lights. Alan Brebner.
- The New Harbor of Trieste. Frederick Bomches.
- Light Draught Launch. Edward Woodrow Cowan and James Fawcens.
- Old Water Supply of Seville. George Higgin.
- A Dioptric System of Uniform Distribution of Light. Alexander Pelham Trotter, B.A.
- On the Passage of Upland Water through a Tidal Estuary. R. W. Peregrine Birch.
- Wood Pavement in the Metropolis. George Henry Stayton.
- On the Area of Sluice Opening necessary for the Supply Sluice of a Tidal Canal. James Henry Apjohn.
- From Institution of Civil Engineers of Ireland:
- Transactions. Vol. XIV.
- From the Institute of Engineers and Shipbuilders, Glasgow, Scotland:
- Transactions. Vol. XXVII.
- From the Iron and Steel Institute, J. S. Jeans, Secretary, London, S. W.:
- The Journal of the Institute. No. 1. 1884.
- From Institution of Mechanical Engineers, Walter R. Browne, Secretary, London:
- Proceedings, August, 1884.
- Proceedings, November, 1884.
- From Lieutenant William H. Jacques, U. S. Navy:
- Proceedings of the U. S. Naval Institute. Vol. X, No. 4.
- From E. Kuichling, Rochester, N. Y.:
- Water and Health. Reprinted by the Spongy Iron Filter Company, 22 New Oxford street, London.
- Pamphlet in reference to the Spongy Iron Water and Sewage Purifying Company, Limited.
- From E. D. Leavitt, Jr., Cambridgeport, Mass.:
- Pumping Machinery—A paper for the Montreal Meeting of the British Association, 1884.
- From H. C. Mais, Adelaide, South Australia:
- Report on Observations on Railways during a tour in 1883, by H. C. Mais, Eng.-in-Chief. Illustrations accompanying the Report of the Engineer-in-Chief, H. C. Mais, on observations on Railways made during his tour in 1883.
- From George A. Marr, St. Paul, Minn.:
- Report on Current Meter Observations in the Mississippi River, near Burlington, Iowa, during the month of October, 1879, illustrated by one sketch and forty-one plates, by Major Alexander Mackenzie, U. S. A.
- From Master Car Builders' Association, M. N. Forney, Secretary, New York City:
- Report of the Proceedings of the Eighteenth Annual Convention of the Master Car Builders' Association, held in Saratoga, N. Y., June 10, 11 and 12, 1884.
- From Isaac H. McEwen, Buffalo, N. Y.:
- Proceedings of the First Annual Meeting of the American Train Despatchers' Association, held at Louisville, Ky., August 20-22, 1884.
- From C. A. McNeale, Secretary Chamber of Commerce, St. Paul, Minn.:
- Annual Report of the Chamber of Commerce of St. Paul, Minnesota.

- From Midland Institute of Mining, Civil and Mechanical Engineers, Joseph Mitchell, Secretary, Barnsley, England:
Transactions. Vol. IX, Parts LXXIII and LXXIV.
- From the Military Service Institution of the United States, Governor's Island, New York Harbor:
Journal of the Institution. Vol. II, Nos. 5, 6, 7 and 8. Vol. III, Nos. 9, 10 and 12. Vol. IV, Nos. 13, 14 and 15. Vol. V, Nos. 17, 18, 19, and 20.
- From Mining Institute of Scotland, James Barrowman, Secretary, Hamilton:
Transactions. Vol. VI, Parts IV and V.
- From George S. Morison, New York City:
Letter of Gen. Adna Anderson, Engineer-in-Chief N. P. R. R. Company to Henry Villard,
From Naval Institute, Annapolis, Md.:
Proceedings. Vol. IX, No. 4.
- From Prof. Simon Newcomb, U. S. N., Washington, D. C.:
Astronomical Papers, prepared for the use of the American Ephemeris and Nautical Almanac. Vol. III, Parts II and III.
- From Gen. John Newton, Chief of Engineers, U. S. A., Washington:
Advertisement, Specifications and Proposals as follows:
Dredging in the Bay of Superior and in the St. Louis River Channel within Superior Bay, Wisconsin.
United States Harbor Improvement, Ludington, Mich.
Improvement of Currituck Sound, N. C.
Dredging in Newport, Harbor, R. I.
United States Harbor Improvement, Grand Haven, Mich.
Improving Gowanus Bay, New York.
Improving Wilmington Harbor, Delaware.
United States Harbor Improvement, Manistee, Mich.
United States Harbor Improvement, Charlevoix, Mich.
United States Harbor Improvement, Muskegon, Mich.
Improvement Harbor at Dunkirk, N. Y.
Improving Newtown Creek, New York.
Improvement of York River, Virginia.
Dredging in Providence River, Rhode Island.
Improvement of Upper St. John's River, Florida.
For Removal of Wrecks in Harbor at New Orleans, La.
Improving Caloosahatchie River, Florida.
Improving Harbor at Cedar Keys, Florida.
Improving Suwannee River, Florida.
For Rock Excavation and Dredging in Taunton River, Massachusetts.
Improvement of Harbors at Washington and Georgetown, D. C.
For Dredging Lubec Channel, Maine.
Stone for Delaware Breakwater Harbor.
For Furnishing Rip-Rap Granite for the Breakwater at Block Island, R. I.
For Dredging Mooseabec Bar, Maine.
For Supplies and Material.
Improving Corsica Creek, Maryland.
Improving Choptank River, Maryland.
Schedules of Supplies and Material, Groceries and Provisions.
Improvement of Volusia Bar, Florida.
Improving Harbor at Cedar River, Michigan.
- Improving Bayou Bartholomew, Louisiana.
Improving Flushing Bay, New York.
Dredging in the Harbor of Grand Marais, Cook County, Minn.
For Building Thirteen Model Barges.
For Repairs to Fort Wayne, Mich.
Proposals for Groceries, Supplies.
Improving the Snake River, Oregon and Wyoming Territory.
Improving Harbor at Sabine Pass, Texas.
Improving Appomattox River, Virginia.
Dredging in the Inland Harbor of Duluth, Minnesota.
Improving Cape Fear River.
Proposals for Stationery Supplies.
For Extending the Eastern Breakwater in Stonington Harbor, Connecticut.
Dredging Saginaw River, Michigan.
Dredging Bar at Mouth of Saginaw River, Michigan.
Improving Harbor at Norfolk, Virginia.
Dredging in Pautucket River, Rhode Island.
Improvement of Romerly Marsh, Georgia.
Improvement of Savannah Harbor and River, Georgia.
Improving Cape Fear River, North Carolina.
Improving the Snake River, Oregon and Wyoming Territory.
Removal of Wreck of Ship "Parkfield."
Improvement of Breton Bay, Maryland.
Improving Harbor at Georgetown, South Carolina.
Dredging in Wareham Harbor, Massachusetts.
Dredging in the Harbor of Refuge, at Wood's Hole, Massachusetts.
Improvement of the Altamaha River, Georgia.
Levee Work—General Instructions for Bidders, and Specifications for Levee Work.
Kentucky River Improvement.
Improvement of Wabash River, Indiana and Illinois.
Improvement of St. Jerome's Creek, Maryland.
Improving Wicomico River, Maryland.
Removal of Hull and Machinery of Dredge Boat, Wrecked at Oakland Landing, San Joaquin River.
Improving Susquehanna River, Maryland.
Improvement of Schuylkill River, Pennsylvania.
Improving Harbor at Ashtabula, Ohio.
Improving Chicago Harbor, Illinois.
Improvement of Savannah River, below Augusta, Ga.
Statement showing Rank, Duties and Addresses of the Officers of the Corps of Engineers.
From New York Meteorological Observatory, Department of Public Parks, Dr. Daniel Draper, Director, New York City:
Abstract of Registers from Self-recording Instruments. September, October and November, 1884.
From Hon. Joseph Nimmo, Jr., Chief of Bureau of Statistics, Washington, D. C.:
The Annual Report on the Foreign Commerce of the United States for the year ending June 30, 1884.
From North of England Institute of Mining and Mechanical Engineers, Theodore Wood Bunning, Secretary, Newcastle-on-Tyne:
Transactions, Vol. XXXIII. Part VI.

From Albert F. Noyes, Newton, Mass. :
Annual Report of the City Engineer for the
year 1885.

From Ferderico Olachea, Secretary
Escuela Especial de Construcciones
Civiles y de Minas, Lima, Peru :
Annales Publicades por la Escuela Con-
strucciones Civiles y de Minas, Tomo IV.

From Ordnance Department, U. S.
A., Gen. S. V. Benet, Chief, Washington,
D. C. :
The Manufacture of Steel and its Applica-
tion to Military Purposes. Captain G.
Mackinlay.
Metrological Investigations. Capt. O. E.
Michaelis.
Index to Ordnance Notes, Vol. XI.

From Luis G. Orozco, Colegio Rosales,
Culiacan, Mexico :
Reglamento Interior del Colegio Nacional
Rosales Culiacan, 1892.
Leyes y Reglamentos de Instruccion Publica
del Estado de Sinaloa, Culiacan, 1892.

From Second Geological Survey of
Pennsylvania :
Coal, Flora, Text and Plates, Vol. III.
Beecher and Hall, part 3.

Grand Atlas Division, II.

Anthracite Coal Fields, Part I.

From State Board of Health, Lunacy
and Charity Department of Health,
Boston, Mass. :

Fifth Annual Report of the State Board of
Health, Lunacy and Charity of Massa-
chusetts.

From Isaac W. Smith, C. E., New
Tacoma, W. T. :

The Theory of Deflections and of Latitudes
and Departures, with special application
to Curvilinear Surveys for alignments of
Railway Tracks.

From United States Naval Observa-
tory, Washington :

"Astronomical and Meteorological Observa-
tions made during the year 1880."

From E. B. Weston, Providence, R.I. :
A General Description of the Providence
Water Works.

From H. F. Walling, Copake Iron
Works, N. Y. :

Co-operation between National and State
Governments in Topographical Surveys.

From other Sources :
The American Exhibition, London, 1886.
Artificial Stone from Lime and Sand.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

Date of Election.

CAMP, FREDERICK ARMAND.....	Steam Heating Engineer, 304 First ave., South, Minneapolis, Minn.	Sept. 3, 1884.
FIELD, BURR KELLOGG.....	Bridge Superintendent, City of Philadelphia, City Hall, Phila- delphia, Pa.	Oct. 1, 1884.
HENNING, CHARLES SUMNER....	Plano, Kendall Co., Ill.	Jan. 7, 1885.

JUNIOR.

FLAD, EDWARD.....	Water Commissioner's Office, St. Louis, Mo.	Jan. 7, 1885.
-------------------	--	---------------

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—April, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

APRIL 1st, 1885.—The Society met at 8 p. m., President Frederic Graff in the chair; John Bogart, Secretary. Ballots were canvassed, and the following candidates elected as Members: Andrew Bryson, Washington, D. C.; Matthew Joseph Butler, Napanee, Ontario, Canada; Edwin Peleg Dawley, Providence, R. I.; William Durfee Gelette, San Francisco, Cal.; Heliodore John Hilbert, Milwaukee, Wis.; Louis Roberts Walton, Earlington, Ky.; Frank Wallace Whitlock (elected Junior October 4th, 1876), Waterbury, Conn.

The President announced that he had, under the provisions of a resolution of the Society, appointed Messrs. H. Stanley Goodwin, C. C. Waite and J. F. Barnard a committee to present the subject of time reform to the railway time conventions.

The paper by E. L. Corthell, M. Am. Soc. C. E., The South Pass Jetties; Ten Years' Practical Teachings in River and Harbor Hydraulics, was discussed by Messrs. William E. Merrill, Whittemore, Comstock, Boller, J. C. Post, North, Wiley, Cooper, Worthen and Adams.

APRIL 15th, 1885.—The Society met at 8 p. m., Vice-President G. S. Greene, Jr., in the chair; John Bogart, Secretary. The discussion on the paper on the South Pass Jetties; Ten Years' Practical Teachings in River and Harbor Hydraulics, was continued by Messrs. McMath, Savage, Chanute, Bixby, Le Baron, Gillmore and Corthell.

The death was announced of Henry M. Wightman, M. Am. Soc. C. E., elected Member April 2d, 1873; died April 3d, 1885.

OF THE BOARD OF DIRECTION.

APRIL 15TH, 1885.—Applications were considered. Financial business was transacted.

APRIL 29TH, 1885.—Applications were considered. Action was taken as to Members in arrears for dues. The time and place for the next Convention were considered, and a committee appointed to perfect arrangements.

ADDITIONS TO

LIBRARY AND MUSEUM.

- From E. Prince, Quincy, Ill.
Report for year ending June 30, 1879, of the Officers of the Water Works of Norfolk, Va.
- Message of John S. Tucker, Mayor of the City of Norfolk, Va., to the Select Common Council, together with Municipal Reports for the six months ending June 30, 1875, and year 1876.
- Report of the Board of Water Commissioners of Norfolk, Va., January 1, 1877 (2 copies), August 4, 1877-1878.
- Report and Plans of the Hon. W. J. McAlpine for a Supply of Water for the City of Norfolk. February, 1871.
- Report of the Board of Water Commissioners of the City of Norfolk, with Rules, Regulations and Ordinances, for the fiscal year ending June 30, 1878.
- Report of the Trustees of the Dayton Water Works to the City Council of Dayton, Ohio, together with the Reports of the Officers of the Board for the year ending December 31, 1873; also Annual Report for the year 1877.
- Fourth, Fifth and Seventh Annual Reports of the Trustees of the Water Works, Dayton, Ohio, for the years 1874, 1875-1877 (2 copies of 1877).
- Annual Reports of the Bangor Water Board for the municipal years 1877 to 1882, inclusive.
- Semi-Annual Report of the Chief Engineer and Superintendent of the St. Louis Water Works. November 1, 1876, 1872-1873 (3 copies). May 1, 1877 (5 copies).
- Message of William Lamb, Mayor of the City of Norfolk, Va., to the Select and Common Councils, together with Municipal Reports for the twelve months ending June 30, 1882.
- Second, Fourth and Sixth Annual Reports of the Water Works Department of the City of Marshalltown, Iowa. 1879, 1881 and 1883.
- Thirty-first Annual Report of the Board of Water Commissioners to the Common Council of the City of Detroit, Mich., for the year 1882.
- Fourth and Fifth Annual Meetings. Reports of the Directors to the Stockholders, Lambertville Water Works, Lambertville, N. J. March 9, 1881, and March 10, 1882.
- The Eyster Improved Water Motor.
- Annual Reports of the Chief Engineer of the Water Department of the City of Philadelphia for the years 1876 to 1881, inclusive.
- Report of the Board of Water Commissioners, submitted to the Comptroller of the City of St. Louis. 1871 (2 copies), 1872 and 1873 (2 copies).
- Statement of the Finances of the City of Peoria, for the fiscal years ending December 31, 1871 and 1876.
- Reports of the Water Commissioners, Water Registrar and Superintendent of Malden, Mass., for the year ending December 31, 1876, to 1879 and 1881.
- Water Commissioners' Report of the City of Springfield, Ill., for the years 1877 and 1880.
- Report of the Board of Water Commissioners, submitted to the City Council of the City of St. Louis, May 1, 1868, 1870; May 1, 1871; November 1, 1872; May 1, 1874, and November 1, 1874 (2 copies).
- Reports of the Water Commissioners, Prudential Committee and Commissioners of Main Drains, &c., of the Pittsfield Fire District, for 1868 and 1869.
- Report of the Board of Water Commissioners of Springfield, Ill. 1869, 1871, 1873 and 1874.
- Rules and Regulations for the Government and Protection of the La Fayette, Ind., Water Works, together with the Tariff of Water Rates.
- Reports of the City Engineer, Supt. Water Works and Chief of Fire Department of the City of La Fayette, Ind., for the year ending April 30, 1877 (2 copies).
- History of the Bangor Water Works, from the commencement, while under the charge of the first Board of Commissioners. 1877.
- Fifth, Sixth and Seventh Annual Reports of the Lawrence Water Board to the City Council, with the Superintendent's Annual Reports, for the years 1880, 1881, 1882.
- Second Annual Report of the Water Commissioners and Superintendent of Water Works of the Town of Pawtucket, R. I. February 1, 1882.
- By-Laws, Rules and Regulations of the Covington City Water Works, as adopted by the Board of Commissioners, March 10, 1876.

- Report of the Chief Engineer, Providence Water Works, January, 1871.
- Statement of the Finances of the City of Peoria for the fiscal year ending December 31, 1875, together with the Treasurer's and Collector's Accounts.
- The Mayor's Message, with Accompanying Documents, to the Municipal Assembly of the City of St. Louis, 1879.
- Eleventh and Twelfth Annual Reports of the Salem Water Board to the City Council, December, 1879, 1880.
- Charter and Rules and Regulations made by the Board of Water Commissioners of the City of South Norwalk.
- Report of the Department of Public Works of the City of New York for the quarter ending September 30, 1877, and March 31, 1879.
- The Mayor's Message, together with the Reports of City Officers of the City of Quincy, Ill., for the years ending March 31, 1874, 1876 and 1877.
- Report on the Sewerage of the City of Quincy, Ill. 1877 (2 copies).
- Annual Reports of the Trustees of the City Water Works of Cincinnati for the years ending December 31, 1867, 1871, 1873.
- Mississippi River Improvement. Convention held at Quincy, Ill., October 15 and 16, 1879.
- Annual Report of the City Officers of the City of Rockford, Ill., for the municipal year ending May 3, 1880.
- Annual Report of the Board of Water Commissioners of the City of Chelsea, for the year ending November 30, 1877.
- Report of the Superintendent of the City of Norwich Water Works to the Board of Water Commissioners, from April 1, 1878, to March 31, 1879.
- Capacity and cost of proposed Water Works extension in Cincinnati.
- Articles of Incorporation of the Dubuque Water Co., together with Ordinances and By-Laws relating to the same.
- Laws, Ordinances and By-Laws for the Management and Protection of the Dayton Water Works, as amended and adopted by the Board of Trustees, April 22, 1875.
- Reports of the Newark Aqueduct Board of the City of Newark, presented December 1, 1870; also Annual Reports for years ending November 30, 1878, 1880 and 1881, and Rules and Regulations of the Newark Aqueduct Board governing the supply of water for the City of Newark, N. J.
- Report of the Acushnet Water Board to the City Council, December 1, 1874; also Seventh Annual Report, December 27, 1876.
- Regulations of the Board of Water Commissioners of the City of Detroit, January 1, 1873; also Twenty-second Annual Report, for the year 1873.
- Report of the Water Commissioners to the Common Council of the City of Albany, transmitting the Report of the Superintendent of the Water Works for the years 1861, 1863, 1864, 1866, 1868, 1869, 1878, 1879.
- The Apena City Water Company. Laws under which the Company is Organized.
- First Annual Report of the Trustees of the Sandusky Water Works, from date of organization to December 31, 1876 (2 copies); also Third Annual Report, January 1, 1879.
- Annual Reports of the Board of Water Works of the City of Toledo, Ohio, for the years 1878, 1879, 1881.
- A Table of General Information Concerning the Water Works of the United States and Canada in 1878 (3 copies).
- Annual Reports of the Board of Water Commissioners of Atlanta, Ga., for the years 1876 and 1877.
- Annual Reports of the Chief Engineer of the Water Department to the City Council of Wilmington for the years 1878 and 1881 (2 copies).
- Annual Reports of the Board of Water Commissioners for 1873 and 1874, of East Saginaw, Michigan; also Rules and Regulations of the same governing the use of water.
- The City Clerk's Financial Statement, Report of the Committee on Holly Water Works, and the City Engineer's Report, giving length of pipe laid and location of pipe, hydrants, etc. (2 copies).
- Sixth, Eighth, Ninth and Tenth Annual Reports of the Superintendent of Water Works to the Board of Water Commissioners of Bay City, Michigan.
- Third and Fourth Annual Reports of the Water Commissioners of the City of Fitchburg, Mass.
- First, Second and Third Annual Reports of the Water Commissioners of the City of New Brunswick, N. J.
- Seventh Annual Report of the Water Commissioners of the village of Saratoga Springs, for the year ending March 31, 1879.
- Twenty-second Annual Report of the Water Commissioners of the City of New Britain, Conn., for the year ending April 1, 1879.
- City of Springfield. Seventh Annual Report of the Board of Water Commissioners to the City Council, together with the Reports of the Registrar and Superintendent, for the year 1880.
- City of Poughkeepsie. Third, Eighth and Ninth, and Fourteenth Annual Reports of the Water Commissioners.
- Annual Reports of the Dayton Water Works for the years 1880 and 1881.
- Annual Report of the Board of Water Commissioners of the City of Manchester for the year ending December 31, 1881.
- Annual Reports of the Board of Water Commissioners to the City of New London for 1877, 1879, 1881 and 1882.
- Annual Reports of the City Officers of the City of Bloomington, Ill., 1876 to 1880, inclusive.
- Tenth Annual Report of the Water Board of the City of Lynn, Mass., for the year ending December 31, 1881 (2 copies).
- Third, Fourth, Sixth and Ninth Annual Reports of the Board of Water Commissioners to the Common Council of the City of East Saginaw, Mich.
- Reports of the Water Department of the City of Camden, N. J., for 1878 and 1880.
- Annual Reports of the Board of Water Commissioners of the City of Holyoke, Mass., 1878 to 1880.
- Annual Report of the New Orleans Water Works Company to the Board of Directors, April 10, 1881 and 1882.
- Tenth and Eleventh Annual Reports of the Board of Water Commissioners of Concord, N. H., to the City Council.
- Thirteenth Annual Report of the Water Commissioner of the City of Newburgh, N. Y.,

- to the Common Council, for the year ending March 10, 1879.
- Annual Report of the Rock Island City Water Works for the year ending February 28, 1877.
- Eighth, Tenth, Thirteenth and Fourteenth Annual Reports of the Buffalo City Water Works (2 copies).
- The Twenty-sixth and Twenty-seventh Annual Reports of the Board of Water Commissioners of the City of Hartford, Conn., to the Court of Common Council, for the years ending March 1, 1880 and 1881.
- Report of the Water Commissioners of the town of Westfield, Mass., on the Construction of the Water Works, December, 1875.
- Annual Report of the Mayor, and Reports of the several Departments of the City of Middletown, Conn., for the year ending January 1, 1881.
- Report of Professor Nichols to the Water Commissioners, Springfield, Mass.
- Cast-iron Water and Gas Pipe Manufactured by the Cincinnati and Newport Iron and Pipe Company, Newport, Ky.
- Annual Reports of the Superintendent, Secretary and Engineer of the City Water Works to the Board of Public Works of Cincinnati for the fiscal years 1877 and 1878. Annual Report of the Trustees for the year 1867.
- Annual Reports of the Chief Engineer of the City Fire Department of Covington, Ky., for the years 1877, 1878 and 1879.
- The Revised Ordinances of the City of Belleville, Ill., 1879.
- Third, Sixth, Tenth and Eleventh Annual Reports of the Trustees of the Water Works of Columbus, Ohio, for the years 1873, 1876, 1880 and 1881.
- First Report of the Superintendent and Secretary of the Burlington Water Works to the Burlington Water Company from acceptance of Works, June 1, 1878, to January 1, 1880 (2 copies).
- Rules and Regulations adopted by the Water Commissioners of the City of Poughkeepsie in relation to Water and Sewers.
- Eighth, Tenth and Eleventh Annual Reports of the Prudential Committee of the North Adams Fire District, for the years 1877, 1879 and 1880.
- Reports of the Board of Water Commissioners of the town of Melrose for the years 1873 to 1878 and 1880.
- Fifth and Sixth Annual Reports of the Sandusky Water Works to the City Council, Sandusky, Ohio, January 1, 1881, and December 31, 1881 (2 copies).
- Annual Reports of the Trustees of the Water Works of the City of Zanesville, Ohio, for the years 1877 and 1879.
- Annual Reports of the Newport Water Works to the Board of Councilmen for the years 1876, 1879 and 1881.
- Annual Reports of the Board of Public Works and City Surveyor of the City of Grand Rapids, Mich., for the years 1881 and 1882.
- Eleventh and Twelfth Reports of the Board of Water Commissioners of the City of Waterbury to the Court of Common Council.
- Report of Duty Test of Pumping Engines at Memphis, Tenn., January, 1882.
- Fourth and Fifth Annual Reports of the Water Works of the City of Bridgeton, N. J., for the years 1881 and 1882.
- First and Third Annual Reports of the Water Commissioners of the City of London, Ontario, Canada, 1879 and 1882 (3 copies of 1879).
- Annual Reports of the Superintendent of the Montreal Water Works for 1873, 1876, 1880, 1881.
- Eighth and Ninth Annual Reports of the Water Commissioners, Waltham, Mass.
- Eighth and Ninth Annual Reports of the Lowell Water Board of the City of Lowell, Mass.
- Seventh and Eighth Annual Reports of the Board of Water Commissioners, Springfield, Mass., together with the Reports of the Registrar and Superintendent.
- Report of the Department of Public Works of the City of New York for the quarters ending Sept. 30, 1877; March 31, 1879, and June 30, 1880.
- Report of the Commission of Engineers upon the Reclamation of the Alluvial Basin of the Mississippi River, being Appendix O of the Annual Report of the Chief of Engineers, U. S. A., for 1875.
- Third Annual Report of the Water Commissioners of the City of Hudson, 1875.
- B. Holly's System of Fire Protection and Water Supply for Cities and Villages, Lockport, N. Y.
- Proceedings of the Mayor's Convention which convened at Springfield, Ill., Oct. 8, 9 and 10, 1878, and January 15, 1879.
- Tariff of Rates and Regulations for the use of the Passaic Water; also Rules Regulating the Plumbing of Houses.
- Tenth Annual Report of the Leominster Water Board.
- Eleventh and Twelfth Annual Reports of the Acushnet Water Board.
- Fifth Annual Report of the Water Commissioners of the Town of Woburn.
- Reports of the Board of Water Commissioners of the Town of Melrose for the financial years ending Dec. 31, 1879 and 1881.
- Sixteenth Annual Report of the Water Commissioners of the City of Springfield, Ill.
- Ninth Annual Report of the Leominster Water Board. March 1, 1881.
- Annual Reports of the Cochituate Water Board to the City Council of Boston for the years 1855, 1857 and 1858, 1860-1876, 1876.
- Boston. Report of the Medical Commission upon the Sanitary Qualities of the Sudbury, Mystic, Shawshine and Charles River Waters.
- Boston. Report of the Joint Standing Committee on Water in Reply to various Orders of the City Council pertaining to Additional Supply of Water, with Report of City Engineer.
- Annual Reports of the Boston Water Board for 1876 to 1880, inclusive.
- Reports of Professor Nichols and Dr. Farlow on matters connected with the Boston Water Supply 1877.
- Report on a Peculiar Condition of the Water Supplied to the City of Boston. 1875-76. By Prof. Nichols, Dr. Farlow and Mr. Burgess.
- Ninth, Tenth and Eleventh Annual Reports of the Mystic Water Board. 1873, 1875 and 1876.
- Report of the Board of Public Works to the Common Council of the City of Grand Rapids, transmitting the Reports of the

- Superintendent, Collector and Engineer of the Water Works, for the fiscal year ending April 30, 1878; also the Annual Report of the City Surveyor (2 copies).
- Reports of the City Engineer, Grand Rapids, Mich., for 1875 and 1876.
- A Report made to the Board of Water Commissioners of the Village of Richfield Springs, by P. H. Baermann, C. E., upon the Water Supply, January, 1879 (2 copies).
- A Water Supply for the Village of Richfield Springs. 1879.
- Reports of the City Engineer, Superintendent Water Works and Chief of Fire Department of the City of La Fayette, Ind., for the year ending April 30, 1877 (2 copies).
- Regulation of Water Rates. Proceedings before the Board of Supervisors, San Francisco. 1880.
- Report of the Water Registrar of the District of Columbia. 1878.
- Reports of the Trustees, Chief Engineer of the Fire Department, Superintendent of Water Works and Treasurer, Covington, Ky., for the year ending Dec 31, 1878.
- Report of the Prudential Committee and Treasurer of the South Adams Fire District for one year and eleven months to March 1, 1878.
- Annual Report of the Water Commissioners of the Town of Medford, Mass. 1878.
- Report of the Water Commissioners of the City of Jacksonville, Ill., April 1, 1875.
- Water Works Ordinance, Augusta, Va. (2 copies).
- Report made to the Special Committee of the Common Council of the City of Grand Rapids. By Peter Hogan, Engineer. April 5, 1873 (2 copies).
- First Annual Report of the Water Works Trustees to the City Council of the City of Piqua, Ohio, for the year ending March 31, 1876.
- The Boston Water Supply. Prof. W. Ripley Nichols.
- Remarks on some Algæ found in the Water Supplies of the City of Boston. W. G. Farlow.
- The Water Supply of the City of New York. E. Waller, Ph. D. (3 copies).
- Catalogue of Water Works. Reports and Information in the United States and Canadas.
- A Table of General Information concerning the Water Works of the United States and Canadas. Published by the Holly Manufacturing Company, Lockport, N. Y., manufacturers of Holly's system of water works 1878.
- By-Law No. 169, to regulate the working and management of the water works of the Town of Sarnia, and for other purposes, as amended April 9, 1877.
- Annual Report of the Phoenixville Water Department for the year ending March 31, 1881.
- Reports of the Superintendent of the Bridgeport Hydraulic Company to the Directors and Stockholders. 1876, 1877 and 1878.
- Rules and Regulations of the Bridgeport Hydraulic Company, Bridgeport, Conn. 1874.
- Annual Reports of the Committee on Water, the Water Commissioner, the Water Registrar and the City Engineer of the City of Worcester for the year ending November 30, 1881.
- Second Annual Meeting, American Water Works Association, Columbus, Ohio, 1882.
- Forty-second Annual Report of the Water Department of the City of Cincinnati, Ohio, for the year ending December 31, 1881.
- Portland Water Company Water Supply, Rates, Rules and Regulations, with a sketch of its history, charter, etc.
- Water Works for the People. William M. Henderson, Hydraulic Engineer.
- Report of the Water Commissioners on the Material best adapted for Distribution of Water Pipes, and on the most economical mode of introducing water into private houses.
- Report on Croton Water. Elwyn Waller, Ph. D., Chemist to the Health Department.
- Tenth Annual Report of the Auditors and other Town Officers of Everett, for the year ending February 29, 1880.
- Second Annual Report of the Board of Health of the City of Utica, N. Y., for the year ending Dec. 31, 1877.
- Report of the Selectmen on the Financial Affairs of the Town of Hingham for the year ending Feb. 1, 1876.
- Report of the Water Department to the Mayor and City Council of Baltimore, Md., for the year ending Oct. 31, 1876.
- Ninth Annual Report of the Board of Water Commissioners of the City of Port Huron, Mich. April 1, 1882.
- Sixth Annual Report of the Water Commissioners of the City of Taunton, Mass. Nov. 30, 1881.
- Annual Reports of the Board of Water Commissioners of the City of Manchester, N. H., for the fiscal years ending Dec 31, 1880 and 1881.
- First Annual Report of the Water Commissioners of the Town of Westborough, Mass. Feb. 1, 1880.
- The First, Third, Fourth, Fifth and Sixth Annual Reports of the Department of Public Works to the City Council of the City of Chicago, for the years 1876 to 1881, inclusive (2 copies of 1876 and 2 of 1879).
- Fourteenth Annual Report of the Board of Public Works to the Common Council of the City of Chicago, Ill., for the municipal fiscal year ending March 31, 1875.
- Seventeenth, Twentieth, Twenty-first, Twenty-second and Twenty-third Annual Reports of the Water Commissioners to the Common Council of the City of Troy, N. Y., for the fiscal years 1871 and 1874 to 1877, inclusive (2 copies for 1871).
- Third, Fourth and Fifth Annual Reports of the Watuppa Water Board to the City Council of the City of Fall River. 1877 to 1879, inclusive (2 copies of 1877).
- Rules and Regulations made by the Board of Public Works of the City of Grand Rapids, Mich., under authority of Board of Public Works Act, approved March 22, 1873.
- Annual Report of the Board of Water Commissioners to the Councils of the City of Erie, Pa., for the fiscal year ending April 30, 1879 (2 copies).
- Second, Third, Fourth, Fifth and Sixth Annual Reports of the City of Keene, containing Inaugural Ceremonies, Ordinances and Joint Resolutions passed by the City Councils, with Reports of the Several Departments, for 1875 to 1879, inclusive.
- First, Second, Third, Fourth, Fifth, Sixth,

- Seventh, Eighth and Twelfth and Final Quarterly Reports of the Water Commissioners, Pawtucket, R. I., for the years 1877 to 1880, inclusive.
- First Annual Report of the Water Commissioners and Superintendent of Water Works of the Town of Pawtucket, R. I. Feb. 1, 1881.
- Three copies of Reports submitted to the Town Council of Pawtucket, R. I., for Dec. 31, 1879; June 30, 1879, and July 8, 1880.
- Final Report of the Board of Water Commissioners of the City of Providence, R. I. Nov. 5, 1880.
- Annual Report of the Chief Engineer of the Water Department to the City Council of Wilmington, Del., for the year 1880.
- Annual Report of the Board of Water Commissioners of the City of Trenton, N. J., for the year ending Jan. 31, 1881.
- City Clerk's Report, Statement of the Finances of the City of Jacksonville, Ill., for the fiscal year ending March 31, 1880; also for the fiscal years ending March 31, 1878 and 1879, together with the Reports of the Treasurer and Superintendent of Water Works for the year ending March 31, 1880.
- Third Annual Report of the Board of Water Commissioners of the Village of Gloversville, N. Y., for the year ending April 30, 1880.
- A Water Supply for the Village of West Troy, N. Y. 1876.
- Fifth Annual Report of the Water Commissioners of the Town of Danvers, for the year ending Dec. 31, 1880.
- Annual Report of the Water Department of the City of Meriden for the fiscal year ending Nov. 30, 1880, to which is appended the Reports of the Sinking Fund Commission and the Treasurer of the Water Department.
- Annual Report of the Board of Water Commissioners, City of Norfolk, Va., for the year ending June 30, 1880.
- Report of the Board of Water Works, including the Secretary's and Engineer's Reports, Pa. is, Ill.
- Sixth Annual Report of the Water Commissioners of the City of Allentown, Pa., for the year ending Dec. 31, 1880.
- Board of Public Works of Jersey City, N. J. Annual Report of the Chief Engineer for the year ending Dec. 31, 1881.
- Data in relation to Lyons, Iowa; Virginia City and Gold Hill, Nevada; Columbia, S. C.; West Troy, N. Y.; Danville, Va.; Garden City, L. I., N. Y.; Lewiston, Me.; Rome, Ga.; Mahoney City, Pa.; Sidney, O.; Syracuse, N. Y.; Milford, Pa.; Pawtucket, R. I.; Covington, Ky.; Auburn, N. Y.; Youngstown, Ohio; Greenwich, Conn.; Bloomington, Ill.; Akron, Ohio; Norfolk, Va.; Archibald, Pa.; Augusta, Me.; Niles, Mich.; Johnstown, Pa.; Birmingham, Conn.; Middletown, Ohio; Norristown, Pa.; Germantown, Pa.; South Norwalk, Conn.; Schenectady, N. Y.; La Fayette, Ind.; New Albany, Ind.
- T. T. Taylor's Inspection Reports of Iron Pipe, Treasurer's Report of the Cedar Rapids Water Company, March 31, 1880.
- Data in relation to Bethel, Fairfield Co., Conn.; Omaha, Neb.; Boston, Mass.; Bristol, R. I.; Poughkeepsie, N. Y.; North Adams, Mass.; Palestine, Texas, contract for Waco Water Works Company; Hannibal Water Works, Eureka, Nevada; Coatesville, Pa.; Lansford, Pa.; Richfield Springs, N. Y.; Plymouth, N. H.; Portsmouth, N. H.; Bangor, Me.; Mt. Joy, Pa.; Passaic, N. J.; Melrose, Mass.; Jeffersonville, Ind.; Meadville, Pa.; Chicopee, Mass.; Sarnia, Mass.; Natick, Mass.; Lake, Ill.; Truro, N. S.; Media, Pa.; Summit Hill, Pa.; Utica, N. Y.; Huntsville, Ala.; Renovo, Pa.; Hingham, Mass.; Leroy, N. Y.; Scranton, Pa.; Norwich, N. Y.; Jamestown, N. Y.; Fredericton, New Brunswick, Canada.
- Ninth Annual Report of the Receipts and Expenditures of the City of Oil City, Pa. Charter and By-laws of the Borough of Winsted, together with the Charter, Rules and Regulations of the Winsted Water Works.
- Annual Reports of the Board of Water Works of the City of Toledo, Ohio for 1875, to 1879, inclusive.
- By-laws and Rules and Regulations for the Management and Protection of the Toledo Water Works, adopted February 10, 1874.
- Data in relation to the Toledo Water Works.
- Annual Reports of the Sewerage and Water Commissioners for the City of St. John (east side) and Parish of Portland for the years 1858, 1865, 1867, 1870, 1871 and 1878.
- Reports of the Superintendent of Water Works for the years 1860, 1861 and 1862, St. John, N. B.
- Reports of the Commissioners of Sewerage and Water Supply, and of the Superintendent and Engineer of the Water Works, 1869.
- Provisional Report on the Sewerage and Water Extensions of St. John, N. B., for the year 1876.
- First, Third, Fourth, Fifth, Sixth and Seventh Annual Reports of the Water Commissioners of the town of Waltham, Mass., for 1874, 1876, 1877, 1878 and 1879.
- Data in relation to Waltham, Mass.
- Second and Third Reports of the Water Board of the Town of Brookline, Mass., for the years 1876, 1878 and 1879.
- Report of the Committee on Water Supply, with letters bearing upon the subject from Engineers and Contractors of Brookline, Mass., 1879.
- Final Report of the Water Commissioners of the Town of Brookline, 1875.
- Supplementary Report of the Committee on Water Supply, Brookline, Mass., with letter of Gen. George S. Greene, Civil Engineer.
- Supplementary Report of the Brookline Water Board, April, 1878.
- Data in relation to Brookline, Mass.
- Third to Seventh Annual Reports of the Board of Water Commissioners of the City of Yonkers to the Common Council, for the years 1875 to 1880, inclusive.
- Report of the City Auditor on Expense of Machinery, Pipe, etc., on introduction of Holly Water Works; also Report of Superintendent of Water Works on the Amount and Condition of Water Pipe in the City of Sacramento, Cal.
- Data in relation to Sacramento, Cal.
- First, Third, Fourth and Fifth Reports of the Public Water Board of the City of Lynn, for the years 1872, 1874, 1875 and 1876.
- Annual Report of the Public Water Board of the City of Lynn for the year ending Dec. 31, 1873 (2 copies).

- Data in relation to Ephrata, Pa.; Elyria, O.; Doylestown, Pa.; Oskaloosa, Iowa; West Brookfield, Mass.; West Springfield, Mass.; Wheeling, Va.; New Carlisle, Pa.; Nantucket, Mass.; Lyons, N. Y.; Andes, N. Y.; Monticello, Iowa; Amsterdam, N. Y.; Alpina, Mich.; Delhi, N. Y.; Central Falls, R. I.; Elyria, O.
- First Annual Report of the Water Commissioners of the Town of Westborough. Feb. 1, 1880.
- Seventh Annual Report of the Water Commissioners of the Town of Winchester, Mass. 1879 and 1880.
- Annual Reports of the Chief Engineer of the Board of Public Works of Jersey City, N. J., for years 1875 and 1878.
- Fifth Annual Report of the Lowell Water Board of the City of Lowell to the City Council, accompanied by the Reports of the City Engineer and of the Superintendent of Water Works to the Board. Jan. 1, 1878.
- Eighth, Eleventh, Twelfth, Thirteenth and Fourteenth Annual Reports of the Water Commissioners of the City of Newburgh to the Common Council.
- Data in relation to Newburgh, N. Y.
- Annual Reports of the Board of Water Commissioners to the City of New London for the years 1874 to 1880, inclusive.
- Data in relation to New London, Conn.
- Scale of Assessment for Annual Water Rent established by the Board of Water Commissioners for the Jacksonville Water Works (3 copies).
- Statement of the Finances of the City of Jacksonville for the fiscal year ending March 31, 1877; also for the fiscal year ending March 31, 1876, together with the Reports of the Treasurer and Superintendent of Water Works for said years.
- Statement of the Finances of the City of Jacksonville for the fiscal year ending March 31, 1875.
- Second Annual Report of the Board of Water Commissioners of the City of Yonkers to the Common Council. Dec., 1874.
- Data in relation to Yonkers, N. Y.
- Annual Report of the School Committee, and the Auditor's Report of the Receipts and Expenditures of the Town of Saugus for the year ending Feb. 28, 1879, together with the Report of the Committee on Water Supply and the Town By-Laws.
- Water Rates adopted by the New Brighton Water Company of New Brighton, Pa.
- The Alpena City Water Company. Laws under which the company is organized. Articles of incorporation. Contract with the city. Bond and mortgage, etc.
- Second Annual Report of the Water Commissioners of Waltham Water Works, Feb. 1875.
- A Table of General Information concerning the Water Works of the United States and Canada. Published by the Holly Manufacturing Company, Lockport, N. Y., manufacturers of Holly's System of Water Works. 1878.
- Data in relation to Lockport, N. Y.
- First, Second, Third, Fourth, Fifth, Sixth, Seventh and Eighth Annual Reports of the Water Commissioners of the Town of Woburn, Mass., for the years 1873 to 1880, inclusive.
- Annual Reports of the City Officers of the City of Minneapolis, Minn., for the years ending April 1, 1879, 1880.
- An Ordinance concerning the Water Works of the City of Minneapolis and the Duties of the Superintendent of the same. Approved May 1, 1878.
- Data in relation to Warsaw, N. Y.; Winsted, Conn.; Pittstown, Pa.; Phenixville, Pa.; Woburn, Mass.; Waverly, N. Y.; Lenox, Mass.; Middletown, N. Y.; Minneapolis, Minn.; Haverhill, Mass.; Holyoke, Mass.; Allegheny City, Pa.; Quincy, Ill.; Titusville, Pa.; Brockton, Mass.; Chattanooga, Tenn.; Urbana, O.; Saginaw, Mich.; Keokuk, Iowa; Berwick, Pa.; Williamsport, Pa.; Chicopee Falls, Mass.; Bellevue, O.; Ithaca, N. Y.; St. John, N. B.; Great Barrington, Mass.; Ashland, Pa.; Corning, N. Y.; Elmira, N. Y.; Petaluma, Cal.; Terre Haute, Ind.; Biddeford, Me.; University of Virginia; Tioga, Pa.; Quincy, Mass.; Tamaqua, Pa.; South Bend, Ind.; Rome, N. Y.; Rock Island, Ill.; Wilmington, Del.; Salem, N. C.; Los Angeles, Cal.; Logansport, Ind.; State Center, Iowa; Ironton, Ohio; Halifax, N. S.; Port Huron, Mich.; Rockville, Conn.; Peekskill, N. Y.; Pueblo, Col.; Sharon, Pa.; Oil City, Pa.; Niagara Falls, N. Y.; Nashville, Tenn.
- Second, Third, Fourth and Fifth Annual Reports of the Board of Water Commissioners of the Town of Natick, Mass. 1876 to 1879, inclusive.
- Annual Report of the Chief Engineer of the Water Works of the City of Wilmington, Del., for the years 1872 to 1879, inclusive.
- Annual Reports of the Several Departments of the City Government of Halifax, Nova Scotia, for the municipal years 1877 to 1879, inclusive.
- Rates, Rules and Regulations in relation to the Introduction, Supply and Use of Water from the Peekskill Water Works for 1876.
- Seventh, Eighth, Ninth, Twelfth, Thirteenth and Fourteenth Annual Reports of the Superintendent of Water Works of the City of Burlington to the City Council of Burlington, Vt.
- Data in relation to Burlington, Vt.
- Annual Reports of the Board of Commissioners of the City Works made to the Common Council of the City of Brooklyn for the years 1873 to 1875 and 1877 to 1879, inclusive.
- Communications from the Water Commissioners to the Mayor and Common Council, Brooklyn, including communication from the Engineer.
- Report of the Engineer to the Commissioners of Sewerage of the City of Brooklyn on the General Drainage of the City. 1859.
- Majority and Minority Reports of the Water Committee on the Communication of the Water Commissioners Brooklyn, proposing to substitute a conduit in lieu of a canal, with the action of the Common Council thereon.
- Reports of Committees and Trustees, Canton City Water Works, for the years 1869 and 1870.
- Report of Trustees of Canton, O., City Water Works, and report of J. L. Pillsbury, engineer, together with report of Messrs. C. Aultman, E. Bull and John Laird. Rules and Regulations.
- Data in relation to Canton, O.
- The Twelfth, Thirteenth, Fourteenth and

- Fifteenth Annual Reports of the Cambridge, Mass., Water Board to the City Council; also report of the Special Committee on the Water Supply of the City, December, 1879, and data in relation to Cambridge, Mass.
- Annual Report of the Board of Water Commissioners of the City of Trenton, N. J., for the year ending February 1, 1880.
- Rules and Regulations of the Water Commissioners of the City of Trenton, adopted February 27, 1879.
- Report of the Trial of the Pumping Engine built for Trenton Water Works by William Wright & Co., Newburgh, N. Y.
- Data in relation to Trenton, N. J., Water Works.
- Reports of the Water Commissioners of the village of Peekskill from 1872 to 1877, inclusive.
- First, Second, Third, Fifth, Sixth, Seventh and Eighth Annual Reports of the Board of Water Commissioners of Concord, N. H., to the City Council.
- The Twenty-third Annual Report of the Receipts and Expenditures of the City of Concord, N. H., for the fiscal year ending February 1, 1876.
- Data in relation to Water Works of Concord, N. H.
- First, Second, Third, Fourth, Fifth, Sixth, Seventh, Eighth and Tenth Annual Reports of the Trustees of the Water Works of Columbus, O.
- By-Laws and Regulations of Columbus Water Works in force May 1, 1877.
- Data in relation to Columbus Water Works.
- First, Second, Third, Fourth, Fifth, Eighth, Ninth, Twelfth, Thirteenth, Fourteenth and Fifteenth Annual Reports of the Board of Public Works to the Common Council of the City of Chicago, and Thirteenth Semi-Annual Report.
- Third Annual Report of the Department of Public Works of the City of New York, for the year ending April 10, 1873.
- Data in relation to the Water Works of Paterson, N. J.; London, Ontario, Canada; Cumberland, Md.
- Blank forms of the Water Works of London, Ontario; also blank forms of Inspector's Report.
- First Annual Report of the Board of Water Commissioners of the village of Johnstown, N. Y., for the fiscal year ending April 30, 1879.
- A Report made to the President and Board of Trustees of the village of Johnstown, P. H. Baerman, C. E., upon the Water Works Question, September, 1877.
- Data in relation to the Water Works of Johnstown, N. Y.
- A Water Supply for the village of Oxford, N. Y., 1879.
- Data in relation to Stockbridge, Mass.; Tyrone, Pa.; Tancakawannock, Pa.; Towanda, Pa.; Salem, Oregon; Sycamore, Ill.; Trinidad, Col.; Walton, N. Y.; South Lee, Mass.; South Hadley, Mass.; San Rafael, Cal.; Santa Barbara, Cal.; Brantford, Canada; St. Thomas, Ont., Canada; Rockland, Maine; Rahway, N. J.; Providence, Pa.; Plainwell, Mich.; Port Byron, N. Y.; Pioche, Nev.; Owen Sound, Ont., Canada; Salt Lake City, Utah Ter.; Ottumwa, Iowa; Northridge, Mass.; New Milford, Conn.; Mt. Holly, N.J.; Methuen, Mass.; Meriden, Ct.; Middleboro, Mass.; Medina, N. Y.; Massillon, Ohio; Marengo, Iowa; Houston, Texas; Hannibal, Mo.; Hanover, Pa.; Great Falls, N. H.; Franklin, Pa.; Liverpool, Ohio; Dover, N. H.; Dowingtown, Pa.; Dallas, Texas; Dansville, N. Y.; Claremont, N. H.; Clarksville, Tenn.; Cheshire, Mass.; Carlisle, Pa.; Carbondale, Pa.; Lansing, Mich.; Lambertsville, N. J.; Kingston, Mass.; Kennet Square, Pa.; Joliet, Ill.; Stillwater, Minn.; Hyde Park, Ill.; Canon City, Col.; Burlington, N. J.; Blue Rapids, Kansas; Boyertown, Pa.; Brighton, Mass.; Bellefonte, Pa.; Auburn, Me.; Middletown, N. Y.; Attica, Ind.; Waco, Texas; Charleston, Ill.; Danvers, Mass.; Leadville, Col.; San Antonio, Texas; Council Bluffs, Iowa; Attica, N. Y.; Knoxville, Tenn.; St. Albans, Vt.; Sedalia, Mo.; Walcottville, Conn.; East Hampton, Mass.; Muskegan, Mich.; Chambersburg, Pa.; Bellows Falls, Vt.
- First Annual Report of the Water Committee and Second of the Water Department of Bridgeton, N. J.
- The First Report of the Water Works Commission of the City of St. Catharines to the City Council, for the year ending December 31, 1879.
- Report on a Water Supply for the Town of St. Catharines, by Thomas Monro, C. E.
- Data in relation to the Water Works of St. Catharines, Canada.
- First, Third and Fourth Annual Reports of the Water Commissioners of the Town of Danvers, Mass.
- Statement of the Accounts of the Town of Danvers for the year ending February 16, 1878.
- Report of the Board of Water Works, including the Secretary's and Engineer's Reports, together with the Tariff of Water Rates and Rules and Regulations. Paris, Ill.
- Report of the Water Department of the City of Camden, N. J., for the year 1878.
- Notice for Proposals for furnishing the City of Omaha, Nebraska, with Water for Fire Protection for a term of twenty-five years.
- Reports of the Board of Water Commissioners of the City of Rochester to the Mayor of the City of Rochester, for the years 1872 and 1875.
- Annual Reports of the Executive Board of Rochester, N. Y., for the years 1877, 1878 and 1879.
- Data in relation to the Water Works of the City of Rochester, N. Y.
- A Revised Edition of Acts of Assembly and Borough Ordinances relating to the Borough of Chambersburg, Pa., together with a brief history of the town from its foundation to the present time.
- Ordinances and Rules Governing the Manikato, Minn. Water Works, adopted by the City Council, May 10, 1880.
- Data in relation to the Water Works of Manikato, Minn.
- First Annual Report of Board of Water Commissioners, and Report of Engineer on Construction of Works, London, Ontario, Canada.
- London Water Works Acts. Schedule of Rates and By-Law. London, Ontario, Canada.
- Second Annual Report of the Board of Water Commissioners of the village of Johns-

- town, N. Y., for the year ending April 30, 1880.
- Department Reports, City of Harrisburg, Pa., for the year 1876.
- Data in relation to the Water Works of the City of Harrisburg, Pa.
- Annual Reports of the Trustees of the City Water Works of Cincinnati, Ohio, for the years 1864, 1868, 1870, 1871, 1872 and 1874 to 1880, inclusive.
- Report of the Board of Experts on the Warden Compound Pumping Engine. March, 1879.
- Special Report on the Extension and Enlargement of the Cincinnati Water Works. T. R. Scowden, C. E.
- Data in relation to the Water Works of Cincinnati, Ohio.
- Report of the Water Registrar of the District of Columbia. 1878.
- Data in relation to the Water Works of Washington and Georgetown, D. C.
- The Seventh and Eleventh Annual Reports of the Mystic Water Board of the City of Charlestown, Mass., for the years 1871 and 1875.
- Water Rates of the City of Charlestown, Mass. 1872.
- Reports of the Commissioners and Chief Engineer of the Charlestown Water Works. February 28, 1863.
- Reports of the Water Commissioners of the City of Chelsea for the years 1868 to 1871 and 1876.
- Report of the Joint Special Committee on Introduction of Water into the City of Chelsea. Jan. 2, 1868.
- Fifteenth, Sixteenth, Seventeenth, Eighteenth, Nineteenth, Twentieth, Twenty-first and Twenty-second Annual Reports of the Board of Trustees of Water Works to the City Council of Cleveland, Ohio, together with the Reports of the Officers of the Board.
- Concise Statement giving the Dimensions, Capacity and Extent of the Important Details of Cleveland Water Works.
- Ordinances, Rules and Regulations for the Management and Protection of the City Water Works of Cleveland, Ohio, as amended and adopted by the Board of Trustees November 10, 1862, and approved by the City Council November 11, 1862.
- Data in relation to the Water Works of Cleveland, Ohio.
- Second, Fourth, Fifth, Sixth, Seventh, Eighth, Ninth and Tenth Annual Reports of the Buffalo, N. Y., Water Works.
- Data in relation to the Water Works of the City of Buffalo, N. Y.
- Annual Reports of the Board of Water Commissioners of the City of Binghamton, N. Y., to the Common Council for the years 1876 to 1879, inclusive.
- Data in relation to the Water Works of Binghamton, N. Y.
- Reports of the Water Commissioners to the Common Council of the City of Albany, N. Y., transmitting the Report of the Superintendent of the Water Works for the years 1853, 1855, 1856, 1858, 1860, 1861, 1863, 1864, 1866 to 1870, 1876 to 1879, inclusive.
- Data in relation to the Water Works of Albany, N. Y.
- Proceedings of the Annual Meeting of the Stockholders of the Alexandria Water Company, held in Alexandria, Va., for the years 1871 to 1879, inclusive.
- Annual Reports of the President and Directors of the Alexandria Water Company to the Stockholders at their Annual Meetings for the years 1851 to 1853 and 1855.
- Report of the President and Directors of the Alexandria Water Company to the Stockholders at their Annual Meeting, Nov. 4, 1867.
- Rules and Regulations governing the Introduction, Supply and Consumption of Water from the Alexandria Water Company.
- Data in relation to the Water Works of Alexandria, Va.
- First Report of the Superintendent and Secretary of the Burlington Water Works to the Water Company from Acceptance of Works, June 1, 1878, to January 1, 1880.
- Reports of the Officers and Committee on Finance of the City of Burlington, Iowa, for the year ending March 3, 1875.
- Rules and Rates of the Burlington Water Company. 1878.
- Data in relation to the Water Works of Burlington, Iowa.
- Reports of the Trustees, Chief Engineer of the Fire Department, Superintendent of Burlington Water Works, and Treasurer, for the year ending Dec. 31, 1878.
- Data in relation to the Water Works of St. Johnsbury, Vt.
- Water Rates Adopted by the Water Commissioners, and Rules and Regulations of the Vallejo City, Cal., Water Company. Dec. 11, 1879.
- Data in relation to the Water Works of Vallejo, Cal.
- Report of the Officers of the Town of Lincoln from Feb. 1, 1877, to Feb. 1, 1878; also the Report of the School Committee for the school year 1877 and 1878.
- Data in relation to the Water Works of Lincoln, Mass.
- Annual Report of the Board of Water Commissioners of the City of Holyoke, Mass., for the years 1874 to 1879, inclusive.
- Third and Fourth Annual Reports of the Water Commissioners of the Town of Medford, Mass.
- Reports of the Water Commissioners of the Town of Medford, Mass., for the years 1874 to 1879, inclusive.
- Data in relation to the Water Works of Medford, Mass.; Avon, N. Y.; Ansonia, Conn.; Beaver Falls, Pa.; Boulder, Col.; Conshohocken, Penn.; Concord, Mass.; College Point, N. Y.; Alton, Ill.; Belaire, O.; Suspension Bridge, N. Y.; Henderson, Ky.; Marysville, Ky.; Santa Cruz, Cal.; South Adams, Mass.
- Annual Report of the various officers and standing committees of the City of Allegheny for the year ending Dec. 31, 1879.
- Sixth, Seventh and Eighth Annual Reports of the Leominster Water Board.
- An Account of the Owensboro Water Company of Owensboro, Ky., and of its First Mortgage Bonds. May 10, 1879.
- By-Laws, Rules and Regulations of the Water Works Company of Owensboro, Ky.
- Report of Construction of Peru Water Works, and Maintenance of same up to May 1, 1880.
- Report of a Committee chosen by the Town of Westborough, Mass., May 15, 1872, to

- make investigations with reference to the feasibility and cost of obtaining a supply of pure water for said town.
- Annual Report of the Rock Island City Water Works for the year ending Feb. 28, 1877.
- Annual Reports of the Treasurer and Recorder, Chief of Fire Department, and other officers of the Nashville City Government for the year ending Oct. 1, 1877.
- Second Annual Report of the Board of Water Commissioners of the City of Port Huron, Mich. April 1, 1879.
- Report of the Trial Test of Water Works at Holly, Mich., Dec. 16, 1879; also Report of Construction Committee, and press notices.
- Charter, By-Laws, Regulations, etc., of the Crystal Lake Water Company of the City of Carbondale, Pa.
- Annual Report of the Chief Engineer of the Salt Lake City Fire Department for the year 1879.
- Mayor's Message and Annual Reports of the several departments of the City of Meriden, Conn., for the year ending Nov. 30, 1879.
- Semi-Annual Report for the year 1877 of the Logansport, Ind., Water Works, together with rules and regulations for the government thereof.
- First, Second, Fourth, Fifth and Sixth Annual Reports of the Water Commissioners of the City of New Brunswick, N. J.
- Data in regard to Hyde Park, Vt.; Coopers-town, N. Y.
- Journal of the Board of Supervisors of Niagara County, and Report of Water Commissioners of Suspension Bridge, N. Y., for the year 1877.
- Report of the Treasurer of the Board of Water Commissioners, Fire District No. 1, of the Town of South Hadley Falls from May, 1872, to March, 1875.
- By Laws and Rules and Regulations for the Management and Protection of the Belaire, O., Water Works. Adopted April 19, 1878.
- Second Annual Report of the Trustees of the Water Works of Mansfield, O., together with the Reports of the Superintendent, Chief Engineer and Secretary May 1, 1874.
- Data in relation to the Water Works of Mansfield, Ohio.
- First Annual Report of the Water Works Trustees to the City Council of the City of Piqua, Ohio, for the year ending March 31, 1876.
- Data in relation to the Water Works of Piqua, Ohio.
- Annual Reports of the Mayor and the Several Departments of the City of Middletown, Conn., for the year ending January 1, 1877.
- Eighth Annual Report of the Board of Water Commissioners of the City of Middletown to the Common Council, for the year ending December 31, 1874.
- Third Semi-Annual Report of the Board of Water Commissioners of the City of Middletown, Conn. January, 1867.
- Data in relation to the Water Works of Middletown, Conn.
- First, Second, Third, Fourth and Final Reports of the Water Commissioners of the City of Lawrence, Mass., to the City Council.
- Data in relation to the Water Works of the City of Lawrence, Mass.
- By-Law to Provide for the Working and Management of the Water Works of the Town of Windsor, Canada.
- Report of the Prudential Committee and Treasurer of the South Adams, Mass., Fire District, for one year and eleven months, to March 1, 1878.
- First, Second, Third and Fourth Annual Reports of the Sandusky Water Works to the City Council, Sandusky, Ohio. January 1, 1880.
- Data in relation to the Water Works of Sandusky, Ohio.
- Annual Reports of the Engineer and Manager Sandusky Water Works for 1878 and 1879, with appendix.
- Annual Reports of the Board of Water Commissioners, Sandusky, Ohio, together with a statement of Receipts and Expenditures for years 1875 to 1877, inclusive.
- Data in relation to the Water Works of Toronto, Canada; Danville, Penn.; Rutland, Vt.; Grand Haven, Mich.; Clinton, Iowa; Columbia, Tenn.; Joplin, Mo.; Marion, Ind.; Wilkesbarre, Pa.; Union City, Ind.; Ionia, Mich.
- The First and Fourth Annual Reports of the Commissioners to the Borough Council of the Town of Sewickley, Pa., and data in relation thereto.
- First, Second, Third, Fourth, Fifth, Sixth and Seventh Annual Reports of the Water Commissioners of the City of Fitchburg, Mass.
- Report of the Committee appointed to make Survey and Estimate of Cost for the purpose of introducing Pure Water into Fitchburg, Mass., 1866.
- Data in relation to the Water Works of Fitchburg, Mass.
- First, Second, Third, Fourth and Fifth Annual Reports of the Water Commissioners of the City of Allentown, Pa.
- Data in relation to the Water Works of Allentown, Pa.
- Report of the Board of Water Commissioners of the City of Springfield, Mass., to the City Council for the years 1875 to 1880, inclusive.
- Data in relation to the Water Works of Springfield, Mass.; Chicago, Ill.; and Dubuque, Iowa.
- Low Service System for the Supply of Water applied to Chicago, Ill.
- Articles of Incorporation of the Dubuque Water Co., together with Ordinances and By-Laws relating to the same.
- First, Second, Third, Fifth, Sixth, Seventh, Eighth, Ninth and Tenth Annual Reports of the Dayton Water Works.
- Laws, Ordinances and By-Laws for the management and protection of the Dayton Water Works as amended and adopted by the Board of Trustees April 22, 1875.
- Rules, Regulations and Penalties of the Dayton Water Works and Tariff of Water Rates as amended and adopted by the Board of Trustees April 23, 1875.
- Report of the Trustees of the Dayton Water Works to the City Council of Dayton, Ohio, together with the Reports of the Officers of the Board for the year ending December 31, 1873.
- By-Laws, Rules and Regulations for the management of the Dayton Water Works

- as adopted by the Board of Trustees April 18, 1870.
- Data in relation to Water Works of Dayton, Ohio.
- Twentieth, Twenty-first, Twenty-second, Twenty-third, Twenty-fourth, Twenty-fifth, Twenty-sixth, Twenty-seventh and Twenty-eighth Annual Reports of the Board of Water Commissioners to the Common Council of the City of Detroit, together with the Reports of the Officers of the Board.
- Regulations of the Board of Water Commissioners of the City of Detroit, Mich. January 1, 1873.
- Data in relation to the Water Works of Detroit, Mich.
- Annual Reports of the Board of Water Commissioners to the Councils of the City of Erie, Pa., for the years 1871 to 1879, inclusive.
- Data in relation to the Water Works of the City of Erie, Pa.
- First, Second, Third, Fourth, Fifth, Sixth Annual Reports of the Watuppa Water Board to the City Council of the City of Fall River, Mass.
- Data in relation to the Water Works of Fall River, Mass.
- Inaugural Address of Hon. Jas. F. Davenport, Mayor of the City of Fall River, and City Officers' Reports.
- Report of the City Engineer, Grand Rapids, Mich., for the years 1875 and 1876.
- Report of the Board of Public Works of the City of Grand Rapids, Mich., for the years 1878 to 1880, inclusive.
- Report made to the Special Committee of the Common Council of the City of Grand Rapids, Mich., Peter Hogan, C. E., April 5, 1873.
- Report of J. L. Pillsbury, Hydraulic Engineer, concerning the supplying of Grand Rapids, Michigan, with water.
- Data in relation to the Water Works of Grand Rapids, Mich.
- Annual Reports of the Superintendent of Water Works of the City of Pittsburg, Pa., for the years 1874 and 1877 to 1880, inclusive.
- Ordinances, Rules and Regulations for the control and management of the Marion Water Works.
- Data in relation to the Water Works of Elizabethtown, N. J.; Easton, Pa.; Evansville, Ind.; Savannah, Ga.; Cohoes, N. Y.; Lebanon, Pa.; Pottsdam, N. Y.; Central City, Col.; Lockhaven, Pa.; Hackensack, N. J.; and Davenport, Iowa.
- Report of the Water Commissioners of the Town of Westfield on the Construction of the Water Works.
- Annual Reports of the Treasurer, Selectmen, Overseers of Poor, Water Commissioners, and Assessors of the Town of Westfield, from February 1, 1877, to February 1, 1878.
- Data in relation to the Water Works of Westfield, Mass.
- Reports of the Standing Committees of the Council of the City of Lynchburg, Va., from July 1, 1875, to July 1, 1876.
- Ordinances of the City of Lynchburg, adopted June 29, 1872, and amended City Charter, approved March 6, 1872, revised and arranged by James Wm. Morgan. Published by order of the City Council.
- Data in relation to the Water Works of Lynchburg, Va.
- Seventeenth to Twenty-third Annual Reports of the Water Commissioners of the City of New Britain, Conn.
- Data in relation to the Water Works of New Britain, Conn.
- Financial Statement of the Municipal Corporation of the City of Hamilton, Ontario, Canada.
- Schedule of Water Rates of Hamilton, Ontario, Canada.
- Water Rates, Rules and Regulations adopted by the Corporation of the City of Hamilton, Ont., in relation to the Introduction and Use of the Water from the City Water Works.
- Data in relation to the Water Works of Hamilton, Ont.
- The enlarged Augusta Canal, Augusta, Ga. Its capacity and advantages for the Manufacture of Cotton Goods, with map of location prepared for publication under the direction of the Board of Managers. Byron Holly, C. E., 1875.
- An Ordinance to provide for the care and management of the Augusta Water Works. Passed March 8, 1866.
- Data in regard to the Water Works of Augusta, Ga.
- Annual Reports of the Town Officers of the Town of Plymouth, Mass., for the years 1877 to 1879, inclusive.
- Annual Report of the Water Commissioners of the Town of Plymouth, Mass.
- Data in relation to the Water Works of the Town of Plymouth, Mass.
- First, Second and Third Annual Reports of the Water Works Committee of the City of Marshalltown, Iowa.
- Data in relation to the Water Works of the City of Marshalltown, Iowa.
- First, Second, Third and Fourth Annual Reports of the Water Commissioners of the City of Taunton, Mass.
- Data in relation to the Water Works of Taunton, Mass.
- The City Clerk's Financial Statement of the City of Rockford, Ill.
- Annual Report of the City Officers of the City of Rockford, Ill., for the year ending May 3, 1880.
- Data in relation to the Water Works of Rockford, Ill.
- Annual Reports of the Mayor of the City of Ogdensburg, N. Y., for 1871, 1872, 1874 to 1876, and 1879.
- Data in relation to the Water Works of Ogdensburg, N. Y.
- Sixth, Seventh and Eighth Annual Reports of the Superintendent of Water Works to the Board of Water Commissioners of Bay City, Mich., for the years 1875 to 1879, inclusive.
- Data in relation to the Water Works of Bay City, Mich.
- Seventh Annual Report of the Water Commissioners of the Village of Saratoga Springs, for the year ending March 31, 1879.
- Charter and By-Laws of the Village of Saratoga Springs, together with the Water Law and By-Laws pursuant thereto.
- Data in relation to the Water Works of Saratoga, N. Y.
- Reports of the Superintendent of the City of Norwich Water Works to the Board of

- Water Commissioners, from April 1, 1870, to March 31, 1875 to 1877, and 1879 and 1880.
- Report on the Physical and Chemical Condition of the Water Supplied to the City of Norwich, Conn., from Fair View Reservoir.
- Report of the Board of Water Commissioners to the Common Council on the Inauguration, Construction and Completion of the Water Works of Norwich, Conn., with the First Annual Statement of their Doings.
- Data in relation to the Water Works of Norwich, Conn.
- Annual Reports of the Water Committee, the Water Commissioner, the Water Registrar and the City Engineer of the City of Worcester, for the years 1874 to 1879, inclusive.
- Data in relation to the Water Works of Worcester, Mass.
- Annual Reports of the Trustees of the Water Works of the City of Zanesville, Ohio, for the years 1873 to 1880, inclusive.
- Data in relation of the Water Works of Zanesville, Ohio.
- Annual Reports of the Superintendent of the Montreal Water Works for the years 1874 to 1879, inclusive.
- Report on the Proposed Enlargement of the Montreal Water Works, Louis Lesage, Superintendent.
- Employees' Regulations, Montreal Water Works.
- Data in relation to the Water Works of Montreal, Canada.
- Third, Fourth, Fifth, Sixth and Seventh Annual Reports of the Board of Water Commissioners to the Common Council of the City of East Saginaw, Mich., together with the Reports of the Superintendent and Secretary.
- Annual Reports of the Board of Water Commissioners for 1873 and 1874 of East Saginaw, Mich.
- An Ordinance establishing the Rules and Regulations of the City of East Saginaw, Mich., together with the Acts of Incorporation of said Board.
- Rules and Regulations of the Board of Water Commissioners of East Saginaw, Mich., Governing the use of Water.
- Data in relation to the Water Works of East Saginaw, Mich.
- Third, Fourth, Fifth and Sixth Annual Reports of the Water Commissioners of the City of Hudson, N. Y.
- Data in relation to the Water Works of Hudson, N. Y.
- Second Annual Report of the Board of Water Commissioners of the City of Waterbury, Conn., together with the Reports of City Clerk, City Treasurer and Treasurer of Bronson Library Fund.
- Data in relation to the Water Works of Waterbury, Conn.
- Statement of the Finances of the City of Peoria for the years 1871, 1872, 1874 to 1879, inclusive.
- Report of the Board of Water Commissioners, submitted to the City Council of the City of St. Louis, Nov. 1, 1867; May 1, 1868; Nov. 1, 1869; May 1, 1870; Nov. 1, 1870; May 1, 1871; Nov. 1, 1871; May 1, 1872; Nov. 1, 1872; Nov. 1, 1874; May 1, 1875; May 1, 1876.
- The Mayor's Message, with Accompanying Documents, to the Municipal Assembly of the City of St. Louis, for 1867, 1878 to 1880, inclusive.
- Reports of the Board of Water Commissioners, submitted to the Comptroller of the City of St. Louis, for May and Nov. 1, 1873, and May 1, 1874.
- Report of the Board of Water Commissioners, submitted to the City Council of the City of St. Louis, Mo., Nov. 1, 1875.
- Proposals to Contractors. St. Louis Water Works.
- Report of the Water Commissioners of the City of St. Louis. October, 1866.
- Semi-Annual Reports of the Chief Engineer and Superintendent of the St. Louis Water Works. Nov. 1, 1876; May 1, 1877.
- Data in relation to the Water Works of St. Louis, Mo.
- Second to Twenty-fifth Annual Reports, inclusive, of the Water Commissioners to the Common Council of the City of Troy, N. Y.
- Data in relation to the Water Works of Troy, N. Y.
- Third and Fourth Annual Reports of the Board of Water Commissioners for the years 1876 and 1877.
- Charter, By-Laws, Rules, Regulations and Water Rates Governing the Atlanta Water Works. Atlanta, Ga., 1875.
- Data in relation to the Water Works of Atlanta, Ga.
- Water Commissioner's Report of the City of Springfield, Ill., for the years 1869, 1871, 1873 to 1880, inclusive.
- Data in relation to the Water Works of Springfield and Peoria, Ill.; Salem, Mass.
- Ordinances for the Government of Water Takers, Plumbers, etc.
- Salem Water Works Reports in 1869.
- Account of the Proceedings upon the Transfer of the Salem Water Works to the City Authorities, Nov. 16, 1869, and the address of W. P. Phillips, Chairman of the Water Commissioners, and William Cogswell, Mayor of the City.
- Second to Tenth, inclusive, Annual Reports of the Water Board of the City of Salem, Mass., to the City Council.
- Report of the Chief Engineer of the Providence Water Works. January, 1871.
- History of the Water Works of the City of Providence. William Aspinwall.
- Second, Third and Fourth Annual Reports of the Board of Water Commissioners of the City of Providence, and Report of the Engineer and Superintendent.
- First to Tenth and final Quarterly Reports of the Board of Water Commissioners of the City of Providence.
- First to Seventeenth Quarterly Reports of the Water Commissioners of the City of Providence.
- Loss of Head, Affecting Fire Streams. Providence Water Works.
- Data in relation to Providence Water Works.
- Report on the Proposed Enlargement of the Montreal Water Works, with maps.
- First to Eighth, inclusive, Annual Reports of the Public Water Board of the City of Lynn, Mass. Duplicates of Third and Eighth.
- First to Seventh, inclusive, Annual Reports of the Water Board of the City of Lowell to the City Council.
- Data in relation to the Water Works of Lowell, Mass.

- Second to Tenth Annual Reports of the Acushnet Water Board to the City Council of New Bedford, Mass.
- Reports of the Department of Public Works, Milwaukee, Wis., for the years 1872, 1876 to 1879, inclusive.
- Annual Report of the Board of Public Works, City of Milwaukee, 1875, 1876, 1877, 1878
- Second to Eighth, inclusive, Annual Reports of the Board of Water Commissioners and Engineers of the City of Manchester, N. H. Duplicate of second and fifth.
- Data in relation to the Water Works of Manchester, N. H.
- Milwaukee Water Works. Report of Board of Water Commissioners, December 1, 1873, to December 31, 1874.
- Report on Milwaukee Water Works, submitted by E. S. Chesbrough, C. E., to his Honor the Mayor and the Committee on Water Works of the City of Milwaukee, Oct 28, 1868.
- Reports on the Trial of Duty and Capacity of the Pumping Engines of Milwaukee Water Works, May, 1875.
- Data in relation to the Water Works of Milwaukee.
- Annual Reports of the village of Kalamazoo, Mich., for the years 1875 to 1877 and 1880.
- Data in relation to the Water Works of Kalamazoo, Mich.
- Reports of the Newark Aqueduct Board of the City of Newark, N. J., for the years 1870 to 1879, inclusive.
- Report on additional Water Supply of Newark, N. J., March 6, 1879. J. J. R. Croes, C. E.
- Rules and Regulations of the Newark Aqueduct Board governing the supply of Water for the City of Newark, N. J.
- Act of Incorporating the Newark Aqueduct Board.
- Data in relation to the Water Works of Newark, N. J.
- First to Eleventh, inclusive, Reports of the Board of Water Commissioners of the City of Providence on Sewers.
- Reports of the Water Commissioners of the City of Providence on Sewers for the years 1873 and 1874.
- Reports of Committees appointed by the Board of Aldermen to construct sewers for the City of Providence, R. I.
- Report on Sewerage in the City of Providence, R. I.
- Official Reports of the Duty Trials of the Providence High-Service Pumping Engines and the contracts under which the engines were constructed.
- The Nagle Pumping Engine, built by the Providence Steam Engine Company.
- Thirteenth, Fourteenth and Fifteenth Annual Reports of the Board of Directors of the New Haven, Conn., Water Co. to the stockholders.
- Reports of the Water Commissioners, Chief Engineer, Commissioners of Main Drains, etc., and Prudential Committee of the Pittsfield Fire District for the years 1868 to 1875, inclusive.
- Data in relation to the Water Works of Pittsfield, Mass.
- Annual Reports to the Fire District of Pittsfield, Mass., for the years 1876 to 1879, inclusive.
- Annual Reports of the City Officers of the City of Decatur, Ill., for the years 1878 to 1880, inclusive.
- Data in relation to the Water Works of Decatur, Ill.
- Sixth to Thirteenth (inclusive) Annual Reports of the Board of Water Commissioners of the City of Waterbury to the Court of Common Council.
- Reports of the Board of Water Commissioners, the City Clerk, City Treasurer and Treasurer of Bronson Library Fund of the City of Waterbury, Conn.
- Municipal Reports, City of Reading, Penn., for the year 1877.
- Auditor's Seventeenth Annual Report of the Receipts and Expenditures of the City of Portland for the financial year 1875-76.
- Annual Report of the Auditors, Common Council and other officers of the City of Vergennes Vt., for the year ending March 8, 1879.
- Annual Report of the City Comptroller of the City of Milwaukee for the year ending December 31, 1879.
- Fourteenth, Fifteenth, Seventeenth to Twenty-sixth Annual Reports of the Board of Water Commissioners of the City of Hartford, Conn.
- Data in relation to the Water Works of Hartford, Conn.
- First and Second Annual Reports of the Water Works Company of Indianapolis, Ind.
- Data in relation to the Water Works of Indianapolis, Ind.
- Statement of the Finances of the City of Jacksonville, Ill., for the years 1875 to 1877, inclusive.
- Data in relation to the Water Works of Jacksonville, Ill.
- Reports of Chief Engineer, Board of Public Works of Jersey City, N. J., for the years 1871 to 1878, inclusive.
- Tariff of Rates and Regulations for the Use of the Passaic Water; also Rules Regulating the Plumbing of Houses and the Tapping of Sewers for the years 1871 to 1879, inclusive.
- A Report on Supplying the City of Oswego with Water, made to the Mayor and Common Council. Wm. J. McAlpine, C. E., September, 1866.
- Annual Reports Submitted to the Board of Councilmen of the City of Newport, Ky., for the years 1875 to 1879, inclusive.
- First Report of the Superintendent of Water Works of the City of Newport, Ky., to the Committee on Water Works of the City Council, made January 1, 1874.
- Annual Report Submitted to the City Council of the City of Newport, Ky., for the years 1871 to 1873, inclusive.
- Rules and Regulations for the Management and Protection of the Newport Water Works, as Adopted by the Board of Water Works Trustees, April 9, 1874, and confirmed by the City Council of the City of Newport, April 15, 1874.
- Newport Water Works' Reports to the Board of Councilmen from March 17 to December 31, 1874.
- Report of Water Works to the Common Council of the City of Newport. T. R. Scowdown, C. E.
- Data in Relation to the Water Works of Newport, Ky.
- Reports, First to Ninth, inclusive, of the

- Board of Water Commissioners to the Town of Northampton on the Inauguration and Construction of the Water Works.
- Data in Relation to the Water Works of Northampton, Mass.
- Annual Reports of the Water Commissioners for the City of Ottawa, Can., for the years 1876 to 1879, inclusive.
- Corporation of the City of Ottawa, Canada, Auditor's Report for the year 1875.
- Assessment Roll of By Ward, City of Ottawa, Canada, for the year 1876
- Assessment Roll of Wellington Ward, City of Ottawa, Canada, for the year 1876.
- Annual Report of the New Orleans Water Works Company to the Board of Directors, April 10, 1879 and 1880.
- Report of Administrator of Water Works and Public Building in Relation to Operations of the City Water Works for the financial year ending September 30, 1871. New Orleans, La.
- Report of the Department of Water Works and Public Buildings from December 19, 1876, to December 31, 1877. New Orleans, La., January 15, 1878.
- Data in Relation to the Water Works of New Orleans, La.
- Annual Report of the Superintendent of the Water Works, City of Allegheny, for the year 1878.
- Denver City Water Company. Articles of Association, Contracts with the City of Denver, etc.
- Water Commissioners' Report, with Water Rates, Contro Costa Water Company, Oakland, Cal., adopted July 26, 1877.
- Eighth Annual Report of the Town Officers of Everett, Mass., for the year ending Feb. 28, 1878.
- Long Branch, N. J., Water Works. 1877.
- Annual Report of the Somerville Mystic Water Board, 1877.
- Report of Commissioners and Engineer of the Plymouth, Mass., Water Works, 1875.
- Report of the Superintendent of the Water Works of Decatur, Ill.
- Holly Water Works in Maine, New York, Indiana and Georgia.
- Data in Relation to the Water Works of the following:
- Port Jervis, N. Y.; Denison, Texas; Frederick, Md.; Altoona, Pa.; Bethlehem, Pa.; Newport, R. I.; Plattsburg, N. Y.; Des Moines, Iowa; Bristol, Pa.; Plymouth, Pa.; York, Pa.; Danbury, Conn.; San Jose, Cal.; Glens Falls, N. Y.; Petersburg, Va.; Dunkirk, N. Y.; Winona, Minn.; Athol, Mass.; Oakland, Cal.; Muscatine, Iowa; Wooster, Ohio; Montgomery, Ala.; Pottsville, Pa.; Anamosa and Cedar Rapids, Iowa; Batavia, N. Y.; Greenfield, Mass.; Kittanning, Pa.; Birmingham, Ala.; Shelburn Falls, Mass.; Denver, Col.; St. Paul, Minn.; Stamford, Conn.; St. Louis, Mo.
- Blank Forms for Reservoir and Engine Reports, Water Rates, etc., Sterling, Ill.; Corry, Pa.; Reading, Pa.; Geneva, N. Y.; St. Joseph, Mo.; Charlottesville, Va.; Marquette, Mich.; Nashua, N. H.; Canajoharie, N. Y.; Louisville, Ky.; New Bedford, Mass.; Vergennes, Vt.; Waukegan, Ill.; Kansas City, Mo.; Jersey City, N. J.; Mauch Chunk, Pa.; New York City; Pottstown, Pa.; Portland, Me.; Jackson, Mich.; Oswego, N. Y.; Martinsburg, W. Va.; Lynn, Mass.; Ottawa, Canada; Norwalk, Ohio, and New Haven, Conn.

THE ROWLAND PRIZE.

CODE OF RULES FOR ITS AWARD.

Not more than one prize shall be awarded each year for papers presented during the year. The year shall terminate on the first day of August, and the award shall be announced at the annual meeting in January.

The prize shall consist of fifty dollars in cash.

The award shall be made by a committee consisting of the Secretary and two members of the Society, to be appointed by the Board of Direction.

The prize shall be awarded to such paper as the committee deem most worthy of such recognition, the preference being given to papers describing in detail accomplished works of construction, their cost and manner of execution, and the errors in design and execution.

THE NORMAN MEDAL.

CODE OF RULES FOR ITS AWARD.

I.—Competition for the Norman Medal of the American Society of Civil Engineers shall be restricted to members of the Society.

II.—There shall be one gold medal, and only one, struck for each and every fiscal year of the Society, and awarded as hereinafter provided. The dies therefor shall be with the Superintendent of the United States Mint at Philadelphia, in trust exclusively for the above purpose. Such medal shall be of a cost equal to the annual interest received upon \$1 000 of the Consolidated Stock of the City of New York, Certificate No. 179, of the additional new Croton Aqueduct Stock of the City of New York, authorized by an Act of the Legislature of the State of New York, Chap. 230, passed April 15th, 1870, dated November 17th, 1873, now held in trust by the Treasurer of this Society, and so held solely for this purpose, and shall be executed upon his order.

III.—All original papers presented to the Society by members of any class, during the year for which the medal is awarded, shall be open to the award, provided that such papers shall not have been previously contributed in whole or in part to any other association, nor have appeared in print prior to their publication by the Society, nor have been presented to the Society in any previous year.

IV.—The Board of Censors to award the medal shall consist of three members of the Society, to be designated by the Board of Direction. The Secretary of the Society shall act as Secretary to the Board of Censors.

V.—The medal shall be awarded to such paper as the said Board shall judge to be worthy of special commendation for its merits as a contribution to engineering science, not merely relatively as compared with others presented during the same year, but as exhibiting the science, talent or industry displayed in the consideration of the subject treated of, and for the good which may be expected to result from the discussion and the inquiry.

VI.—In case no paper presented during the year shall be deemed of sufficient value to receive an award, the amount of the interest of the fund for that year shall be expended by the Board of Direction in the purchase of books, to be offered as a premium for the second best paper in the next year in which more than one paper of sufficient value may be presented.

VII.—The medal year shall terminate on the first day of August, and the award shall be announced at the annual meeting.

VIII.—The Treasurer of this Society shall cause the medal to be prepared and delivered to, or deposited to the order of, the successful competitor, within two months after the annual meeting at which the same shall have been awarded.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.		Date of Election.
BRYSON, ANDREW.....	Ch. Engineer Harlem and Hartford R. R. and East River and Connecticut R. R., Norwalk, Conn...	April 1, 1885.
BUTLER, MATTHEW JOSEPH....	Ch. Engineer Napanee, Tamworth and Quebec R. R., Napanee, Canada	" "
DAWLEY, EDWIN PELEG.....	Engineer New York, Providence and Boston R. R., Providence, R. I....	" "
GELETTE, WILLIAM DUFEE....	Ch. Assistant Engineer Central Pacific R. R., corner Fourth and Townsend streets, San Francisco, Cal.....	" "
HENTHORN, JOHN THOMAS....	Corliss Steam Engine Co., Providence, R. I.....	Dec. 3, 1884.
HILBERT, HELIODORE JOHN....	335 Hanover street, Milwaukee, Wis.,	April 1, 1885.
WALTON, LOUIS ROBERTS....	Engineer for the St. Bernard Coal Co., Earlington, Ky.....	" "
WHITLOCK, FRANK WALLACE....	(Elected Junior, October 4, 1876.) Assistant Engineer, City Engineer's office (P. O. Box 715), Waterbury, Conn.....	" "

DEATHS.

HADDOCK, ARBA R.....	Elected Associate, May 4, 1881; died February 28, 1885.
KINGSLEY, WILLIAM C.....	Elected Fellow, June 6, 1870; died February 21, 1885.
MERZ, FREDERICK W.....	Elected Fellow, May 6, 1870; died December, 1883.
WIGHTMAN, HENRY M.....	Elected Member, April 2, 1873; died April 3, 1885.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—May, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

MAY 6TH, 1885.—The Society met at 8 P. M., President Frederic Graff in the chair; John Bogart, Secretary. Ballots were canvassed and the following candidates elected: as Members—Clifford Buxton, Toledo, Ohio; Richard Morley Harison, Liverpool, England; John Franklin Hineckley, North Springfield, Mo.; Olaf Hoff, Pittsburgh, Pa.; Edmund Dorman Libby, St. Louis, Mo.; Robert Henry Temple, Richmond, Va.; Theodore Voorhis, Balston Spa, N. Y.; as Junior—David Coley Sanford, New Haven, Conn.

Announcement was made that the Convention of the Society would be held at Deer Park, Md., on the line of the Baltimore and Ohio Railroad, June 24th to 27th, 1885.

The presentation to the Society by Dr. J. E. Hilgard, M. Am. Soc. C. E., Superintendent United States Coast and Geodetic Survey, of a model of the basin of the Gulf of Mexico, from soundings made by the United States Coast Survey, was announced.

A paper by Eliot C. Clarke, M. Am. Soc. C. E., "Record of Tests of Cement made for the Boston Main Drainage Works, 1878-1884," was presented.

The discussion of the paper on the South Pass Jetties was continued by Messrs. James B. Eads and E. L. Corthell.

MAY 20TH, 1885.—The Society met at 8 P. M., Mr. Joseph P. Davis, M. Am. Soc. C. E., in the chair; John Bogart, Secretary. The paper by C. C. Schneider, M. Am. Soc. C. E., on The Cantilever Bridge at Niagara Falls, was discussed by Messrs. Christie, T. C. Clarke, Cooper, Gayler, Goodridge, Hawks, Macdonald, Marshall, Morison, Frederick H. Smith, Henry W. Wilson, Joseph M. Wilson and Schneider.

The paper by George H. Pegram, M. Am. Soc. C. E., "Formulas for the Weights of Iron and Steel Railway Bridges under Standard Specifications," was discussed by Messrs. Becker, Hughes, Hutton, Cooper, Macdonald, Whittemore, Joseph M. Wilson and Pegram.

OF THE BOARD OF DIRECTION.

MAY 6TH, 1885.—Applications were considered. The Committee of the Board reported the result of a visit to points which had been considered with reference to the next Convention. The determination of the time and place for the Convention having been at the Annual Meeting of the Society referred, with power, to the Board, it was determined that the place should be Deer Park, Md., and the time, June 24th, 1885. Action was taken as to Convention details.

MAY 20TH, 1885.—A communication received on the subject of the Report of the Committee on a Uniform System for Tests of Cement was directed to be sent to that committee. A communication, entitled "The Permanent Basis for a National Engineering Society," was presented with a letter from A. M. Wellington, M. Am. Soc. C. E., and it was directed that the communication be printed for the information of members who may wish to discuss the subject in the regular meeting of the Society, to be held during the Convention, for the transaction of business.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—June, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

ANNUAL CONVENTION OF THE SOCIETY.

HELD AT DEER PARK, MARYLAND, ON THE 24TH, 25TH AND 26TH OF JUNE,
1885.

FIRST SESSION.

WEDNESDAY, JUNE 24TH, 9:30 A. M.—The Convention was called to order by Mr. FREDERIC GRAFF, President of the Society. The Secretary, Mr. JOHN BOGART, read the provisions of the Society law relating to Conventions. The President stated that under the provisions of that law referring to the chairmanship of the Convention, he had been requested by the Committee of Arrangements to nominate Mr. MENDES COHEN, M. Am. Soc. C. E., of Baltimore, Md. Mr. Cohen was, by the Convention, elected Chairman and was introduced by President Graff. Mr. COHEN said:—

Mr. President and Members of the Society, I am deeply sensible of the distinguished honor conferred upon me in thus selecting me to preside over your Convention, and am equally sensible of my own want of experience in previous Conventions of the Society, so that I must trust somewhat to your indulgence. We meet here, for the first time, I think, in the history of the Society, in the State of Maryland, and as one of the few members of the Society from this State I bid you a hearty welcome. You are on the line of the Baltimore and Ohio Railroad, a work with which the State has been very largely indented from the very outset,

and a work which has grown from a very bold undertaking and very small beginnings to its present proportions. The road, in its development, has extended now to the far west, and, as you all know, is striving to reach the north as well. The success of the road has been very largely due to the honesty with which it was originally built. What is claimed for it especially is that very little of the money laid out on it has ever stuck to anybody's fingers, it has all gone into the work; and that, perhaps, is one of the reasons why to-day it is successful when a great many other roads are in trouble—there has been but little money wasted upon it in the past.

The Past Presidents of the Society present at the Convention, Messrs. JULIUS W. ADAMS, JAMES B. FRANCIS and DON J. WHITTEMORE, and the President, Mr. FREDERIC GRAFF, were requested to occupy seats with the Chairman.

Mr. JOHN BOGART, M. Am. Soc. C. E., was chosen Secretary, and Capt. O. E. MICHAELIS, M. Am. Soc. C. E., was chosen Assistant Secretary of the Convention.

The order of proceedings as prepared by a Committee of Arrangements was then announced.

A paper by Mr. EDWARD BATES DORSEY, M. Am. Soc. C. E., on "English and American Railroads Compared," was, in the absence of the writer, read by Secretary Bogart, and discussed by Messrs. M. J. Becker, W. H. Bixby, John Bogart, O. Chanute, Mendes Cohen, F. Collingwood, E. L. Corthell, J. J. R. Croes, Thomas Egleston, Frederic Graff, Charles E. Goad, J. J. De Kinder, Edward P. North, O. E. Michaelis, James Owen, William Sellers, William P. Shinn, Oberlin Smith, and A. M. Wellington.

A paper by Professor THOMAS EGLESTON, M. Am. Soc. C. E., on "The Cause and Prevention of Decay in Building Stones," was read by the writer, and discussed by Messrs. M. J. Becker, W. H. Bixby, Fred. Brooks, Charles B. Brush, Mendes Cohen, F. Collingwood, Theodore Cooper, J. J. R. Croes, F. G. Darlington, J. F. Flagg, Thomas H. Johnson, W. Katte, P. Roberts, Jr., William P. Shinn, Oberlin Smith, D. J. Whittemore, C. J. H. Woodbury, and Thomas Egleston.

SECOND SESSION.

JUNE 24TH.—The session of the Convention was resumed at 3 o'clock, Mr. MENDES COHEN, M. Am. Soc. C. E., in the chair.

The report of the Committee on the Preservation of Timber was presented by Mr. O. CHANUTE, Chairman of the Committee, and was read by Assistant Secretary O. E. Michaelis. The subject was discussed by Messrs. F. Collingwood, J. Foster Crowell, J. J. R. Croes, Thomas Egleston, J. F. Flagg, James B. Francis, E. A. Fuertes, C. Latimer, A. W. Locke, Edward P. North, and D. J. Whittemore.

THIRD SESSION.

JUNE 24TH.—The session of the Convention was resumed Wednesday evening, at 8 o'clock, Mr. MENDES COHEN, M. Am. Soc. C. E., in the chair.

The Annual Address was delivered by Mr. FREDERIC GRAFF, President Am. Soc. C. E.

After the close of the address stereopticon views of bridges and other structures illustrating discussions were exhibited by Mr. JOHN BOGART, Secretary.

FOURTH SESSION.

THURSDAY, JUNE 25TH.—The session of the Convention was resumed Thursday morning, at 9.30 o'clock, Mr. MENDES COHEN, M. Am. Soc. C. E., in the chair.

A paper by Mr. F. COLLINGWOOD, M. Am. Soc. C. E. on "The Preservation of Forests," was read by the writer, and the subject was discussed in connection with the subject of the Preservation of Timber by Messrs. O. Chanute, Mendes Cohen, F. Collingwood, J. J. R. Croes, J. F. Flagg, James B. Francis, T. Egleston, Charles Latimer, G. Lindenthal, Edward P. North, J. Nelson Tubbs, A. M. Wellington, and C. J. H. Woodbury.

A paper by Mr. JOSEPH M. WILSON, M. Am. Soc. C. E., on "Specifications for Strength of Iron Bridges," was, in the absence of the writer, read by Assistant Secretary O. E. Michaelis. This paper, and the paper by Mr. C. C. SCHNEIDER, M. Am. Soc. C. E., on "The Cantilever Bridge at Niagara Falls," were discussed by Messrs. Benjamin Baker, M. J. Becker, O. Chanute, F. Collingwood, Theodore Cooper, J. G. Dagron, F. G. Darlington, E. B. Dorsey, Charles Douglas Fox, G. Lindenthal, Charles A. Marshall, P. Roberts, Jr., William Sellers, and C. L. Strobel.

The desire of the Department of Steam Transportation of the United States National Museum, at Washington, to secure all practicable aid from the American Society of Civil Engineers in perfecting its collection was presented by Mr. J. Elfreth Watkins, C. E.

FIFTH SESSION.

JUNE 25TH.—The session of the Convention was resumed Thursday evening after the business meeting, Mr. WILLIAM P. SHINN, M. Am. Soc. C. E., in the chair, *pro tempore*.

On motion of Mr. E. L. CORTHELL, M. Am. Soc. C. E., it was resolved: That during the remaining sessions of the Convention, the reading of papers or discussions be limited to fifteen minutes each, and that oral discussions be limited to five minutes; that these limits be extended

in no case except by vote of the Convention, and that no person should speak more than twice on the same subject.

The provisions of the Society Law were read in reference to the appointment of a committee to present nominations for officers of the Society for the next year, and the following members of the Society were duly elected as such committee :—J. Herbert Shedd, of Providence, R. I. ; M. J. Becker, of Columbus, Ohio ; Rudolph Fink, of Little Rock, Ark. ; D. J. Whittemore, of Milwaukee, Wis. ; George H. Mendell, of San Francisco, Cal.

SIXTH SESSION.

FRIDAY, JUNE 26TH.—The session of the Convention was resumed Friday morning, at 9:30 o'clock, Mr. MENDES COHEN, M. Am. Soc. C. E., in the chair.

A paper by Mr. J. A. OCKERSON, M. Am. Soc. C. E., on "New Method of Making Conventional Signs on Topographical Maps," was, in the absence of the writer, read by Secretary John Bogart.

A paper by Mr. W. D. BULLOCK, Jun. Am. Soc. C. E., "Description of Guard Gates at the Point Street Bridge at Providence, R. I.," was, in the absence of the writer, read by Secretary John Bogart.

A paper by Mr. CLEMENS HERSCHEL, M. Am. Soc. C. E., on "The Problem of the Submerged Weir," was, in the absence of the writer, read by Secretary John Bogart.

The paper by Mr. E. SWEET, M. Am. Soc. C. E., on "The Radical Enlargement of the Artificial Water-way between the Lakes and the Hudson River," was discussed by Messrs. A. Bryson, F. Collingwood, E. L. Corthell, William R. Hutton, and Edward P. North.

On motion, a recess was taken to permit the continuation of the business meeting of the Society.

SEVENTH SESSION.

FRIDAY, JUNE 26TH.—The Session of the Convention was resumed after the adjournment of the business meeting, Mr. MENDES COHEN, M. Am. Soc. C. E., in the chair.

An abstract of a paper by Mr. WILLIAM R. HUTTON, Director Am. Soc. C. E., on "The Mouth of the Maas," was read by the author, and discussed by Mr. E. L. Corthell.

An abstract of a paper by Capt. O. E. MICHAELIS, M. Am. Soc. C. E., subject, "Can we make Heavy Guns?" was presented by the author, and discussed by Professor T. Egleston.

A paper by Mr. CHARLES LATIMER, M. Am. Soc. C. E., on "Railroad Organization," was read by the writer, and discussed by Messrs. O. Chanut, E. L. Corthell, and Charles Latimer.

A paper by Mr. CHARLES B. BRUSH, M. Am. Soc. C. E., on "The Aeration of Water," was read by the author, and discussed by Messrs. J.

J. R. Croes, J. F. Flagg, James B. Francis, E. Kuichling, William E. Merrill, J. Nelson Tubbs, and Charles B. Brush.

An abstract of a paper by Professor S. W. ROBINSON, M. Am. Soc. C. E., on "Vibration of Bridges," was presented by the author.

EIGHTH SESSION.

FRIDAY, JUNE 26TH.—The Session of the Convention was resumed Friday afternoon, at 3 o'clock, Mr. WILLIAM SELLERS, M. Am. Soc. C. E., in the chair, *pro tempore*.

A paper by Mr. WILLIAM P. SHINN, M. Am. Soc. C. E., on "Power Brakes for Freight Engines and Cars," was read by the writer, and discussed by Messrs. F. Collingwood, E. L. Corthell, J. F. Flagg, Thomas H. Johnson, Charles Latimer, G. Lindenthal, and William P. Shinn.

A paper by Mr. THOMAS H. JOHNSON, M. Am. Soc. C. E., on the "Strength of Columns," was read by the writer.

A discussion by Professor A. J. DU BOIS, M. Am. Soc. C. E., on the paper on "Formulas for the Weight of Iron and Steel Railway Bridges," was read by Mr. D. McN. STAUFFER, M. Am. Soc. C. E., and the subject was discussed by Mr. GEORGE H. PEGRAM, M. Am. Soc. C. E., the writer of the paper.

A discussion by Mr. J. A. OCKERSON, M. Am. Soc. C. E., on the paper by Mr. Robert E. McMATH, M. Am. Soc. C. E., on "Levee Theory Tested by Facts," was presented by the Secretary.

On motion of Mr. CHARLES LATIMER, M. Am. Soc. C. E., it was resolved: That the American Society of Civil Engineers, in convention assembled, views with satisfaction the effort being made by the National Government, through the Smithsonian Institution, to perpetuate the history of the birth and development of the American Railway System, by the establishment of the new department of Steam Transportation in the National Museum.

On motion of Mr. EDWARD P. NORTH, M. Am. Soc. C. E., it was resolved: That the thanks of the Convention of the American Society of Civil Engineers be tendered to the officers of the Baltimore and Ohio Railroad for the courtesies and kindness extended to the members of the Society in the arrangements made for their comfort by that railroad; also to Mr. R. K. MARTIN, C. E., Chief Engineer of the Baltimore Water Works, for the instructive and enjoyable trip to the works under his charge; also to the members of the Society resident at Baltimore, for their attention to those visiting that city *en route* to the Convention.

Resolved, That the thanks of this Convention be tendered to MENDES COHEN, Esq., M. Am. Soc. C. E., Chairman of the Convention, for the able and courteous manner in which he has conducted the deliberations of this Convention.

The Convention then adjourned.

The following 93 members were in attendance at the Convention : Julius W. Adams, Brooklyn, N. Y. ; W. H. Atwood, Fannettsburg, Pa. ; Fred. Brooks, Boston, Mass. ; John W. Bacon, Danbury, Conn. ; John Bogart, Henry R. Bradbury, New York City ; Wm. F. Booth, Poughkeepsie, N. Y. ; Charles B. Brush, Hoboken, N. J. ; A. Bryson, Washington, D. C. ; C. P. E. Burgwyn, Richmond, Va. ; Wm. H. Bixby, Wilmington, N. C. ; M. J. Becker, Columbus, Ohio ; G. Bouscaren, Cincinnati, Ohio ; Theodore Cooper, E. L. Corthell, J. James R. Croes, New York City ; W. B. Cogswell, Syracuse ; C. L. Crandall, Ithaca, N. Y. ; Francis Collingwood, Elizabeth ; Martin Coryell, Lambertville, N. J. ; Mendes Cohen, Baltimore, Md. ; S. H. Chittenden, Washington, D. C. ; J. Foster Crowell, Pittsburgh, Pa. ; O. Chanute, Kansas City, Mo. ; E. P. Dawley, Providence, R. I. ; Joseph P. Davis, New York City ; Frank G. Darling, Pittsburgh ; Charles Davis, Allegheny, Pa. ; Thomas Eggleston, New York City ; James B. Francis, Lowell, Mass. ; Arthur J. Frith, J. Foster Flagg, New York City ; E. A. Fuertes, Ithaca, N. Y. ; Rudolph Fink, Little Rock, Ark. ; Fred. Graff, Philadelphia, Pa. ; David M. Greene, Troy, N. Y. ; Charles E. Goad, Montreal, Canada ; Charles E. Greene, Ann Arbor, Mich. ; Stephen S. Haight, West Farms ; Wm. J. Haskins, Frank H. Howes, William R. Hutton, New York City ; William A. Haven, Buffalo, N. Y. ; James H. Harlow, William P. Harris, Pittsburgh, Pa. ; James D. Hawks, Detroit, Mich. ; W. H. Jennings, Thomas H. Johnson, Columbus, Ohio ; Walter Katte, New York City ; Emil Kuichling, Rochester ; Louis H. Knapp, Buffalo, N. Y. ; A. W. Locke, North Adams, Mass. ; C. H. Latrobe, Baltimore, Md. ; Gustav Lindenthal, Pittsburgh, Pa. ; Charles Latimer, Cleveland, Ohio ; Sidney F. Lewis, New Orleans, La. ; O. E. Michaelis, West Troy, N. Y. ; Henry G. Morris, Philadelphia, Pa. ; David E. McComb, A. G. Menocal, Washington, D. C. ; C. A. Marshall, Johnstown, Pa. ; William E. Merrill, Cincinnati, Ohio ; Edward P. North, F. O. Norton, New York City ; James Owen, Newark ; F. S. Odell, Lawrenceville, N. J. ; Franklin C. Prindle, Bloomfield, N. J. ; George H. Pegram, Wilmington, Del. ; John A. Partridge, Washington, D. C. ; William A. Pratt, Clarksburg, W. Va. ; James C. Post, Cincinnati, Ohio ; Joseph R. Richards, Boston, Mass. ; B. Frank Richardson, Percival Roberts, Jr., Philadelphia, Pa. ; James L. Randolph, Baltimore, Md. ; S. W. Robinson, Columbus, Ohio ; George F. Swain, Boston, Mass. ; William P. Shinn, D. McN. Stauffer, New York City ; Oberlin Smith, Bridgeton, N. J. ; William Sellers, Philadelphia, Pa. ; Frederick H. Smith, Baltimore, Md. ; Charles L. Strobel, Pittsburgh, Pa. ; Arthur H. Scott, Milwaukee, Wis. ; J. Nelson Tubbs, Rochester, N. Y. ; William Watson, C. J. H. Woodbury, Boston, Mass. ; Edmund B. Weston, Providence, R. I. ; Nelson J. Welton, Waterbury, Conn. ; A. M. Wellington, William H. Wiley, New York City ; John A. Wilson, Philadelphia, Pa., and D. J. Whittemore, Milwaukee, Wis.

Forty-six ladies of the families of members accompanied them on the occasion of this Convention.

On Thursday afternoon, by invitation of the Baltimore and Ohio Railroad, an excursion was made to the Cheat River Grade, the Kingwood Tunnel, the Tray Run Viaduct, and other points on the mountain division of the road. The Tray Run Viaduct was designed thirty-three years ago by Mr. Albert Fink, Past President Am. Soc. C. E., and is particularly interesting as one of the earliest iron viaducts. Under the guidance of the engineers who had been engaged in the construction of the railway, the line, with 10 per cent. grade, which was operated during the construction of the Kingwood Tunnel, was examined. The beautiful scenery of the Cheat River was greatly enjoyed.

On Friday evening occurred the banquet, at the Deer Park Hotel. Towards the close of the banquet toasts were given and responded to as follows :

"The Pioneer Railroad Engineers of Our Country : Their daring and successful efforts have furnished a sure foundation for the present magnificent superstructure." Responded to by Mr. Mendes Cohen, Chairman of the Convention.

"The Engineer : A man of broad scientific education, ready to undertake the utilization of every phenomenon and power of nature to the needs of man." Responded to by Mr. Don J. Whittemore, Past President Am. Soc. C. E.

"The Engineer Abroad : The modern apostle preaching and practicing true scientific methods *in partibus remotis*." Responded to by Mr. Charles H. Latrobe, M. Am. Soc. C. E.

"Our Past Presidents : The laurels they have won are imperishable garlands that will keep their memories green in our annals." Responded to by Col. Julius W. Adams, Past President Am. Soc. C. E.

"The Future of the American Society of Civil Engineers as a Factor in Engineering Progress." Responded to by Mr. Frederic Graff, President Am. Soc. C. E.

"The Baltimore and Ohio Railroad : Pioneer and Picturesque." Responded to by Mr. Samuel Spencer, First Vice-President of the B. and O. R. R.

"The Ladies." Responded to by Mr. Theodore Cooper, Director Am. Soc. C. E.

A large number of members of the Society met in Baltimore on the Monday previous to the Convention. Arrangements had been made by the members resident in Baltimore, in concert with other residents of the city, and with the officers of the Baltimore and Ohio Railroad, for two excursions on Monday afternoon.

One party left the Camden station early in the afternoon and went

by rail to Locust Point, and inspected the freight and marine terminal arrangements of the Baltimore and Ohio Railroad, the elevators and docks. The fire service was also exhibited.

A sail about the harbor of Baltimore was then enjoyed through the courtesy and under the guidance of Mr. N. H. Hutton, C. E., engineer in charge of the Harbor Works.

The steamer then proceeded to Fort McHenry and then to Fort Carroll, the works of which were examined under the escort of Lt.-Colonel William P. Craighill, Corps of Engineers, U. S. A. The return to Baltimore was by boat to Curtis Bay, and by special train on the Baltimore and Ohio Railroad to the city.

The other party, by invitation and under the escort of Mr. R. K. Martin, Chief Engineer of the Baltimore Water Department, visited the Water Works. Carriages were taken to the station of the Western Maryland Railroad, and by special train, the impounding reservoir, Loch Raven, on the Gunpowder River, was reached. The Masonry Dam and the Gate House were examined, a model built to scale aiding greatly in this examination. After a hospitable entertainment, the party next visited Lake Montebello, the settling reservoir at the terminus of the seven-mile tunnel conduit from Loch Raven. The works of construction of Lake Clifton were then examined, and the return made to the city through Druid Hill Park, where the Pumping Station and the reservoir for high service were inspected.

On Monday evening the members and their families visited the Baltimore Academy of Music, by invitation of the officers of the Baltimore and Ohio Railroad.

On Tuesday morning, June 23d, a special train on the Baltimore and Ohio Railroad was taken. The first stop was at the Mt. Clare shops of the road, where an hour was spent in a general inspection. The train thence proceeded by the old main line, stops being made at points of engineering or picturesque interest. Deer Park was reached early in the evening.

On Saturday morning, after the close of the Convention, those who desired to go east took the special train on the Baltimore and Ohio Railroad. This train was run to Baltimore and Washington at remarkably high speed. At Baltimore a transfer was made to a special train of the Pennsylvania Railroad in waiting, which was run directly through to Philadelphia and New York. Special resolutions of thanks for this courtesy were passed to the Pennsylvania Railroad Company and to Mr. Charles E. Pugh, General Manager.

The special trains on the Baltimore and Ohio Railroad were very handsomely arranged, and the officers of the road were constant in their attention to the members of the Society, whose acknowledgment is particularly due to Mr. C. K. Lord, the General Passenger Agent; Mr. J. G. Pangborn, the Assistant General Passenger Agent; Mr. W. N.

Bolling, Engineer of Real Estate; Mr. Charles Ackenheil, Engineer Mt. Clare shops; Mr. W. P. Harris, Superintendent Pittsburgh Division, and other officers of the road.

The result of this Convention at the Deer Park Hotel has been, in the opinion of the members attending, a successful accomplishment of the suggestions advanced in the circular on the subject, issued by the Board of Direction at the beginning of the year, namely:

"The presentation, consideration and undisturbed discussion of professional subjects.

"The opportunity for free intercourse between members of the Society gathering at our Conventions from all parts of the United States, and, in fact, of the world.

"Such opportunities for social recreation as may not interfere with, but rather aid, the other objects mentioned above."

MEETINGS OF THE SOCIETY.

JUNE 3D, 1885.—The Society met at 8 P. M., President Frederic Graff in the chair; John Bogart, Secretary. Ballots were canvassed and the following candidates declared elected: as Members: Ellery Cushing Appleton, Canajoharie, N. Y.; Norman Wilder Eayrs, Newport, R. I.; John Douglas Fouquet, Fishkill, N. Y.; Francis Vinton Greene, Washington, D. C.; Edlow Wingate Harrison, Jersey City, N. J.; Robert Woolston Hunt, Troy, N. Y.; William Cornell Jewett, Cincinnati, Ohio; Charles Roberts Johnson, New York City; Jonathan Parker Snow, Woonsocket, R. I.; Denning Jarves Thayer, New York City. As Associate: John Woodbridge Davis, New York City. As Junior: William Barnard Fuller, Glendive, Montana.

The death, on May 30th, 1885, of Mr. M. T. Seymour, F. Am. Soc. C. E., was announced.

The paper by Eliot C. Clarke, M. Am. Soc. C. E., "Record of Tests of Cement made for the Boston Main Drainage Works, 1878-1884," was read and discussed.

JUNE 17TH, 1885.—The Society met at 8 P. M., Mr. John C. Campbell, M. Am. Soc. C. E., in the chair; John Bogart, Secretary.

A paper by Clemens Herschel, M. Am. Soc. C. E., on "The Problem of the Submerged Weir," was presented.

Mr. S. B. STEVENSON, C. E., gave an account of the progress of work on the Panama Ship Canal, upon which he had been for some time engaged.

JUNE 25TH, 1885.—(Business Meeting during the Annual Convention at Deer Park, Md.) The Society met at 8 o'clock, Thursday evening, Mr. Frederic Graff, President, in the chair; John Bogart, Secretary.

The Report of the Committee on the Preservation of Timber was presented by the Chairman, Mr. O. CHANUTE, M. Am. Soc. C. E., and on motion was accepted. The thanks of the Society were tendered to the

Committee for the very faithful manner in which they have discharged their duties and the excellent report they have made, and the Committee was discharged.

The report of a majority of the Committee on a Uniform System for Tests of Cements was presented, with a letter from Gen. Q. A. GILLMORE, M. Am. Soc. C. E., Chairman of the Committee.

A minority report was presented by Messrs. D. J. WHITTEMORE and F. O. NORTON, members of the Committee.

After discussion by Messrs. J. J. R. Croes, Joseph P. Davis, T. H. Johnson, William P. Shinn, D. J. Whittemore, Theodore Cooper, Thomas Egleston, and Charles Latimer, it was, on motion, resolved that both the majority and minority reports be received and printed in the Transactions of the Society, and that the thanks of the Society be tendered to the members of the Committee, and the Committee be discharged.

(For further action see page 98.)

The Committee, Messrs. H. STANLEY GOODWIN, C. C. WAITE, and JOHN F. BARNARD, appointed to present the subject of Standard and Improved Time to the Railway Time Conventions, reported progress, and was continued. This Committee was appointed under a resolution adopted at the Annual Meeting in January last, and in accordance with the recommendations of the Standing Committee on Uniform Standard Time.

The President of the Society stated that at the Annual Meeting in January last it was resolved that the Committee to which had been referred the subject of a Uniform System for Tests of Cements be requested by the Board of Direction to consider the subject of the compressive strength of cement, and also of the actual compression of cement and the settlement of masonry, and the Board be empowered to fill the place of any members of that Committee who may not be desirous of serving upon this continued investigation.

Steps had been taken by the Board to complete the organization of such a Committee and it would be announced after the publication of the report of the present Committee.

The subject of a place for the next Convention was presented.

The following letter was read:

THE AMERICAN EXHIBITION IN LONDON, 1886, }
CITY OFFICES: 7 POULTRY, LONDON, E. C., }
5TH JANUARY, 1885. }

D. J. WHITTEMORE, Esq., *President,*

The American Society of Civil Engineers, New York.

DEAR SIR,—As the representative of the Executive Council of the American Exhibition to be held in London in 1886, it affords me exceeding pleasure on their behalf to invite the American Society of Civil Engineers to hold their Annual Convention in London in 1886

We shall be delighted to provide the members with rooms for their meetings, and to do all in our power to promote their pleasure and comfort.

Negotiations have already been entered into with Atlantic steamship lines by which a material saving in the usual passenger rates will be effected, and such of the members of your Society as shall honor us by accepting our invitation will, of course, have every communication afforded them, so that they may profit by the favorable terms we are certain to obtain.

In the hope that this invitation will be favorably received and accepted,

I am, dear sir, yours respectfully and faithfully,

JOHN R. WHITLEY, *Director-General.*

Accompanying this were letters to Mr. Whitley expressing a desire to co-operate in giving welcome to American Engineers, should they decide to meet in London, as invited. These letters were from the Society of Engineers, London; the Institution of Engineers and Shipbuilders in Scotland; the Institution of Civil Engineers of Ireland, and the North of England Institute of Mining and Mechanical Engineers.

Further consideration of the subject was postponed by unanimous consent.

Mr. A. M. WELLINGTON, M. Am. Soc. C. E., offered the following resolution, which was seconded by Mr. CHARLES LATIMER, M. Am. Soc. C. E.:

Whereas, The relation which the form of the head of a rail should bear to the section of a car-wheel tread and flange has recently been in dispute, it being asserted, on the one hand, that they should have as long a line of contact as possible, and, on the other hand, that such long contact would be dangerous and injurious; and,

Whereas, The question raised by this diversity of view is of direct importance to many members of this Society, as well as to the public interest, and hence is one which this Society may appropriately consider through committee; therefore, be it

Resolved, That a committee of five members of this Society be appointed by the President to consider and report to the Society on the proper relation to each other of the sections of rails and wheels; to what extent and at what points it is expedient that their sections should be such as to bring them normally in contact, and to what extent and at what points it is not expedient that they should be so in contact; and that the Committee be instructed to seek information from all those who are known to have given the subject attention.

Under the provisions of section 23 of the By-Laws this resolution was referred to the Board of Direction to report to the Society, and to be issued for vote by letter ballot.

Mr. A. M. WELLINGTON, M. Am. Soc. C. E., offered the following resolution :

Resolved, That the President be authorized to appoint a committee, to consist of seven members of the Society, which committee shall be instructed to consider the matter of making such changes in the organization of the Society as may be desirable in connection with the subject of local engineering societies or clubs, and of sections or chapters of the Society ; also to take into consideration the future policy of the Society in relation to the admission of branches of engineering not now generally represented in the Society ; and that the committee be authorized to confer directly with the members of the Society and with local organizations ; the committee to report the information obtained and conclusions, if any, reached by the committee.

Mr. WELLINGTON.—I presume that almost every member here has received a memorandum in the form of a paper which I have presented before the Board of Direction, and I will not occupy time in reading it, but I wish to add a few words which have occurred to me since that time in answer to certain objections which I have heard. I think a very large majority of the Society are in favor of the general idea covered by that resolution. I think that I have submitted in that paper all that is incumbent on me to do, and I will simply add that in taking this action at all I have acted from a sense of duty and from a strong interest in the Society, and desire for its welfare. I have conferred with only a few members in regard to it ; I have not attempted to work up any sentiment in its favor. If the sentiment of the Society in general is in favor of the plan which I have outlined, I think it will be greatly to its interest ; if it is not, the responsibility will rest with some one besides me. I will, however, read a few communications which have reached me, mostly since I came here. I sent a few copies of the paper I have referred to through the Secretary to various officers of the local engineering societies, and I have received, mostly at this Convention, a number of responses, showing in a general way the sentiment with which they viewed it. Perhaps the most interesting one is the last report of the Western Society of Engineers of their meeting held on the 16th of June. The meeting was devoted to the general question raised by my paper, and the result is stated as follows : "The expression of views of members present was unanimously favorable to the general suggestions made by Mr. Wellington." I simply refer to this as one of the indications that in an association that already exists there is a strong movement to develop that association into something which shall mount into a national organization on a little different plan from this, but under conditions which I think would be seriously disadvantageous to this Society to allow to go on.

Mr. Wellington also read communications received by him on the same subject from Benezette Williams, Esq., President of the Western Society of Engineers, and others.

Mr. E. L. CORTHELL.—I second the resolution.

Capt. O. E. MICHAELIS.—Having heard the resolution read, it appears to me that it is not in strict concord with the discussion of the proposer. There is nothing in the resolution relating to the formation of a national society, and from the tenor of Mr. Wellington's remarks I was led to believe that his resolution covered that.

Mr. A. M. WELLINGTON.—I made no remarks on the subject of a national association; I simply read letters in regard to it.

Capt. O. E. MICHAELIS.—In regard to that matter I desire to say that so far as national laws can carry out a purpose, this Society is already a national society. It may be chartered under the laws of the State of New York for the purpose of holding real estate there, but the Congress of the United States, three years ago, in accordance with the action of a committee of this Society, of which I was at that time a member, did formally recognize this Society, and the law recognizes to-day this Society as a national organization, and the law has been re-enacted three times since that date.

Mr. CHARLES LATIMER.—I am a member of the Western Society of Engineers and also of the Cleveland Society. I want to state that there is no antagonism in either of those societies to the American Society of Civil Engineers, but, on the contrary, an excellent feeling. The Presidents of those societies have been selected in many instances from the American Society of Civil Engineers, and I want to see the resolution start right, with a proper feeling in the Society. I wish to say that a joining of the societies in some manner is very advisable. The national society is already here, and it is the national society of the country. There is no necessity for two, but joining these societies together is certainly an admirable arrangement, and will produce great good. With any possibility of jealousy, or any feeling engendered here or there, it should not be done; but certainly there would not be anything contrary to the best interests of the engineering societies of the whole country in joining them together in some way. In regard to the question of equality it is only a question of acquirements—no question of social tests—simply a question of education.

Mr. E. L. CORTHELL.—In seconding this resolution I intended to say a word. I have given this matter considerable thought since it was first brought to my attention some time ago by Mr. Wellington, and it has been in the line of my thought for some years past, the uniting, as far as possible, the whole engineering profession in every possible way. I think the remarkable development and growth of other engineering societies in this country shows how strong the sentiment is in other societies of uniting together for mutual improvement, for mutual help, and for assistance to the profession. There are a large number of societies, and this paper that Mr. Wellington has written shows that there is a large fellowship of engineers who have united themselves in

this and other societies. What I have in my mind is nothing in the way of a suggestion, but simply the utterance of my sentiment, and that is, if there can be a confederation by which all members of the profession can be drawn together more closely for mutual improvement and benefit it will assist us very materially in many ways that we do not now appreciate. We know how valuable the assistance is that we get by meeting here once a year, the assistance we get in New York by meeting once or twice a month. Now, if the whole profession in the United States shall be united in a society that shall be a confederation of societies, and shall have a strong central government, just like our own central government of the whole country, I think it will not only assist us in many ways, but it will have a tendency to elevate the profession in the country and before the country in every way. I think it is generally conceded that the standing of the profession in this country is not where it ought to be, and where its education and experience and talent should place it, and this is one step upward in elevating the profession, and that is the reason I am for it, if the details can be worked out practically without injury to the interests of others.

Prof. E. A. FUERTES.—I came here without having given this matter any thought at all, and without having talked to anybody about the subject except in a very casual way. My business compels me to be posted with what is going on outside in the world, and I see a great many papers of engineering bodies in this country and others. Two facts strike me as very significant: first, that I do not think the Society has grown as fast as it ought to have grown as compared with other societies far younger than ours; also, that a large amount of engineering work is going on in other countries, as well as in our own, of which this Society knows nothing. We should be able to make the Society an American society, not only in name, but also in fact. It seems to me that this Society should be the center from which all engineering information should be spread throughout the country. Again, I do not think that there is a very great deal of good feeling among the members; at all events, I have to think that there is some dissatisfaction among engineers throughout the country in reference to the way in which the American Society of Civil Engineers is at work. The younger members of the profession seem to think that they are not cared for, that the Society seems to think that only the professional man of large experience is fit to take an interest in shaping the progress of the country in engineering matters, and the young men are left out entirely. The resolution, as I have read it, seems to remedy the worst of these evils. It is the exclusiveness of the Society that is complained of, and I shall be very glad indeed if any method can be adopted by means of which all these engineering clubs and societies throughout the country could be made to assimilate.

Mr. EDWARD P. NORTH.—I would like, before this motion is put, to

move an amendment additional to it. I believe in the desirability of the passage of the resolution, but I would like to have it include also a view of the organization and methods of this Society. It is within the knowledge of every one here present, I suppose, that some two or three years since the Society of Mechanical Engineers was formed. I understood, before that was formed, that it was to be formed. The question was canvassed in this Society, and no effort at all was made to prevent its formation by giving inducements to them to join our Society. Within a year or so the Society of Electrical Engineers requested, not officially, but by some of its members, permission to join this Society. That society also has been organized. Now, I think this Society should cover all the points covered by Telford in his definition of an engineer. We do not want to confine ourselves strictly to builders and layers of brick work, but we ought to combine all branches of the engineering profession in this Society. I would like to have the resolution so amended that the committee shall report on the principles of the Society in regard to the admission of branches of the profession, and members or bodies that are not now connected with it.

Mr. D. J. WHITEMORE seconded the amendment.

Mr. WELLINGTON accepted the amendment.

Mr. JAMES H. HARLOW.—Does not that come under By-Law 23, that such a resolution must be submitted to a ballot of the Society?

The PRESIDENT.—The By-Law applies to engineering subjects. I do not think that this resolution comes under that By-Law. This is not an engineering subject.

Mr. CHARLES LATIMER.—It seems to me far more important than any question of engineering. I think it should be referred. It would not be the thing to decide it here, except as an expression of opinion.

The Secretary read the By-Law.

Mr. JAMES H. HARLOW.—It seems to me that Mr. Latimer is correct in saying that this is a matter of more importance than any engineering subject is likely to be, and if it is in order, I would like to amend that resolution by moving that the resolution be submitted to the members of the Society by letter ballot. I think these members should have a chance to say yes or no on that proposition, and although we have quite a number here, I suppose it is not more than 25 per cent. of the whole membership.

Mr. F. COLLINGWOOD.—It seems to me that we have certainly a representative body of our Society here, and we have always been accustomed, so far as appointing a committee of this Society was concerned, to act upon such questions here. Of course, the conclusions of the committee must go to the Society for action, but I do not see why it is necessary, so far as appointing the committee is concerned, to refer it to the Society.

Mr. JAMES H. HARLOW moved that the resolution, as amended, be referred to the Society for letter ballot.

Mr. J. F. FLAGG.—I agree with Mr. Collingwood that we should appoint this committee here. It commits us to nothing whatever, and it seems to me entirely unnecessary to delay the appointment of the committee in this way.

Mr. Harlow's motion was submitted to the Convention and lost. The resolution was adopted, and the committee was ordered to consist of seven members.

The resolution is printed above as adopted.

JUNE 26TH, 1885.—(Second business session during the Convention.) The Society met, President FREDERIC GRAFF in the chair; John Bogart, Secretary.

Mr. EDWARD P. NORTH moved that the resolution adopted (see above, page 92), in reference to printing both the Majority and Minority Reports of the Committee on a Uniform System for Tests of Cements, be reconsidered.

The motion was seconded and carried.

Mr. WILLIAM P. SHINN moved that the Reports be referred back to the Committee, with the request from this Convention that the paragraph relating to the strength of cements be taken out of the body of the Report and added as a foot note.

The resolution was seconded and discussed by Messrs. William P. Shinn, E. L. Corthell, T. Egleston, J. J. R. Croes and Oberlin Smith.

The resolution, as printed above, was carried.

Mr. WILLIAM SELLERS, M. Am. Soc. C. E.—I wish to offer a resolution, which, I hope, this society will fully indorse. We have been, as you know, for several years endeavoring to get an appropriation from Congress to carry out certain tests, and the discussion yesterday only emphasizes, I think, the importance of carrying out these tests upon steel for structural purposes. We have absolutely no information that is reliable for such metal, under compression particularly, and with a view to urge that matter efficiently in the next Congress, I would offer this resolution:

Resolved, That the Board of Direction be, and they are hereby, authorized and directed to memorialize Congress to appropriate \$10 000 for the purpose of making tests on structural steel upon the large testing machine at Watertown Arsenal, in accordance with a programme to be furnished by this Society, as provided for by existing law; and as it is understood that this large machine is now chiefly used in making tests which would be better made upon a small machine, which tests exclude the more important ones, it is the sense of this Society that a great saving to the country would result from the use of such small machine for such purposes.

The resolution was seconded and adopted.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—July, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

JULY 1ST, 1885.—The Society met at 8 P. M., Director William R. Hutton in the chair; Charles E. Emery, M. Am. Soc. C. E., Secretary *pro tem*. Ballots for membership were canvassed, and the following named candidates declared elected: As Members: Herbert Leander Aulls, Council Bluffs, Iowa; Lewis Kingman, Topeka, Kansas; Alonzo Tyler Mosman, Beverley, Mass.; Benjamin Franklin Richardson, Wilmington, Delaware; Robert Parker Staats (elected Junior, November 3d, 1875), Jersey City, N. J. As Juniors: Henry Holbrook Gladding, New Haven, Conn.; Charles Ezra Marvin, Henderson, Ky.; Aaron J. Zabriskie, Newark, N. J.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.		Date of Election.
BUXTON, CLIFFORD.....	Ch. Eng. Ohio Central R. R., Toledo, Ohio.....	May 6, 1885.
EAYRS, NORMAN WILDER.....	U. S. Engineers' Office, New- port, R. I.....	June 3, 1885.

FOUQUET, JOHN DOUGLAS.....	Assistant Eng. and Sup't Bridges, New York, West Shore and Buffalo Ry., Fishkill, N. Y.....	June 3, 1885.
GREENE, FRANCIS VINTON.....	Capt. Corps of Engineers, U. S. A., Washington, D. C.	" "
HINCKLEY, JOHN FRANKLIN.....	Res. Eng. St. Louis and San Francisco Ry., Van Buren, Ark.....	May 6, 1885.
HOFF, OLAF.....	29 Mackey - Legg Block, Minneapolis, Minn.....	" "
HUNT, ROBERT WOOLSTON.....	Gen. Supt. Albany and Rensselaer Iron and Steel Co., Troy, N. Y.....	June 3, 1885.
JEWETT, WILLIAM CORNELL.....	35 West Fourth st., Cincin- nati, Ohio.....	" "
JOHNSON, CHARLES ROBERTS.....	Union Switch and Signal Co., Pittsburgh, Pa.....	" "
LIBBY, EDMUND DORMAN.....	U. S. Custom House, St. Louis, Mo.....	May 6, 1885.
MOSMAN, ALONZO TYLER.....	U. S. Coast and Geodetic Survey, Franklin Furnace, Ohio.....	July 1, 1885.
NOYES, ALBERT FRANKLIN.....	City Engineer, West Newton, Mass.....	Dec. 3, 1884.
RICHARDSON, BENJAMIN FRANKLIN.....	Div. Eng. Delaware Division Baltimore and Philadel- phia R. R., 1604 South 11th st., Philadelphia, Pa.....	July 1, 1885.
ROBERTS, POULTER BENJAMIN.....	Executive Engineer, Nuddea Rivers Division, Berham- pore, Bengal, India.....	Dec. 5, 1883.
SNOW, JONATHAN PARKER.....	Woonsocket, R. I.....	June 3, 1885.
TEMPLE, ROBERT HENRY.....	205 West Grace st., Rich- mond, Va.....	May 6, 1885.
VOORHEES, THEODORE.....	Supt. Northern R. R. Dept., Saratoga and Champlain Div. Delaware and Hudson Canal Co., Ballston Spa, N. Y.....	" "

ASSOCIATE.

DAVIS, JOHN WOODBRIDGE.....	25 West 119th st., New York City.....	June 3, 1885.
-----------------------------	--	---------------

JUNIORS.

FULLER, WILLIAM BARNARD.....	Northern Pacific R. R., Bismarck, Dakota.....	June 3, 1885.
------------------------------	--	---------------

GLADDING, HENRY HOLBROOK.....	18 City Hall, New Haven, Conn.....	July 1, 1885.
JOHNSON, SINCLAIR JOSEPH.....	213 Alexander ave., New York City.....	Jan. 7, 1885.
MARVIN, CHARLES EZRA.....	Henderson Div. Louisville and Nashville R. R., Hen- derson, Ky.....	July 1, 1885.
RAASLOFF, HAROLD EDWARD DE.....	Tacoma, Washington Terri- tory	Dec. 3, 1884.
ZABRISKIE, AARON J.....	Asst. Eng. Improved Sewer- age, Heath Building, New- ark, N. J.....	July 1, 1885.

CHANGES AND CORRECTIONS.

MEMBERS.

BABCOCK, HENRY N.....	U. S. Engineers' Office (P. O. Drawer 7), Milwaukee, Wis.
BALLARD, ROBERT.....	Ch. Eng. Queensland Central and Northern Railway Division, Rockhampton, Queens- land, Australia.
BARNARD, AUGUSTUS P.....	Sheffield, Berkshire Co., Mass.
BILLIN, CHARLES E.....	186 Dearborn st., Chicago, Ill.
BRUNER, DANIEL P.....	Harrisburgh, Pa.
CROWELL, J. FOSTER.....	Eng. of Construction P. R. R., Pittsburgh, Pa.
FULLER, SIDNEY T.....	Kennebunk, Maine.
GORDON, ROBERT.....	Howley Lodge, Maida Hill, West, London, England.
GRAY, GEORGE E.....	1115 Bush st., San Francisco, Cal.
GRISWOLD, FRANK L.....	98 Calle Piedad, Buenos Ayres, Argentine Republic.
JUDSON, JOHN A.....	86 Ashland Block, Chicago, Ill.
LONG, THOMAS J.....	Morse Bridge Co., Youngstown, Ohio.
NOURSE, EDWIN G.....	Ch. Eng. Chicago and Evanston R. R., Room 33, Ashland Block, Chicago, Ill.
O'ROURKE, JOHN F.....	407 Market st., Harrisburgh, Pa.
SMITH, HAMILTON, JR.....	(Care American Exchange) London, England.
STEARNS, IRVING A.....	Wilkesbarre, Pa.
STEVENS, FRANK S.....	Athens, Pa.
THURSTON, ROBERT H.....	Sibley College, Cornell University, Ithaca, N. Y.
WALKER, JOHN S.....	Box 57, Hot Springs, Ark.
WHITE, W. HOWARD.....	74 Wall st., New York City.

JULY PROCEEDINGS.

JUNIORS.

BISSELL, FRANK E.....410 Washington st., South Bend, Ind.
FRANCIS, GEORGE B.....40 West 126th street, New York City.
LUCAS, D. JONES.....56 Pierce St., Lewiston, Maine.

DEATHS.

GORRINGE, HENRY H.....Elected Associate April 6, 1881; died July
6, 1885.
MALÉZIEUX, EMILE.....Elected Honorary Member November 3,
1880; died May 20, 1885.
SEYMOUR, M. T.....Elected Fellow July 21, 1870; died May 30,
1885.

RESIGNATIONS.

MEMBERS.

EARNSHAW, HENRY..... May 1, 1885.
KIMBERLY, MOSES C..... May 15, 1885.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—August—September, 1885.

NOTE.—No meetings of the Society were held in August.

CONTRIBUTIONS TO THE BUILDING FUND.

By a resolution of the Board of Direction, all contributions to the Building Fund are to be acknowledged, from time to time, by printing lists of the same in the monthly Proceeding of the Society, and in addition to this the names of all those who may subscribe \$100 or more are to be regularly enrolled and published in future lists of the Society under the head of Subscribers to the Building Fund, and they will be entitled to receive one copy of the monthly publications, comprising all papers and transactions of the Society, regularly for life, for each \$100 subscribed by them ; such copies to be in addition to those which they may be already entitled to if they are Members or Fellows.

The following contribution is acknowledged in addition to those heretofore noted:

John E. Earley..... \$25.00

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.		Date of Election.
HARISON, RICHARD MORLEY.....	12 Lancelots Hey, Liverpool, England	May 6, 1885.
KINGMAN, LEWIS.....	Asst. Eng. Atchison, Topeka and Santa Fé R.R., Topeka, Kansas	July 1, 1885.

CHANGES AND CORRECTIONS.

MEMBERS.

GATES, HORACE D.....	301 Lombard st., San Francisco, Cal.
HOOD, WILLIAM.....	Ch. Eng. Southern Pacific R. R., Pacific System, San Francisco, Cal.
HUNT, RANDELL.....	130 Summit ave., St. Paul, Minn.
LE BARON, J. FRANCIS.....	Asst. Eng. Gulf Coast Canal Co., Inspector of Lands, Jacksonville, Tampa & Key West R. R., Rooms 8 and 9, Bostwick's Building, Jacksonville, Fla.
NICHOLS, OTHNIEL F.....	Contractor, Paducah, Ky.
SAFFORD, EDWARD S.....	Sharon, Mass.
SMITH, HAMILTON, JR.....	10 Bolton st., Piccadilly, London. England.
STAATS, JOHN H.....	113 Hudson st., Jersey City, N. J.

JUNIORS.

EMONTS, WILLIAM A. G.....	(Care C. H. Kellogg), 378 Main st., Buffalo, N. Y.
RAYMOND, CHAS WARD.....	(Care SooySmith & Co.), 2 Nassau st., New York City.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—October, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

SEPTEMBER 2D, 1885.—The Society met at 8 P. M., Mr. William E. Worthen, M. Am. Soc. C. E., in the chair; John Bogart, Secretary. Ballots were canvassed and the following candidates declared elected as members: David Herbert Andrews, of Boston, Mass.; Thomas Sparks Bishop, New Britain, Conn.; George Washington Cooley, Minneapolis, Minn.; Sidney Willett Hoag, Jr., New York City; Samuel Killebrew, Brownsville, Tenn.; Milnor Peck Paret, Leesport, Pa.; Samuel McMath Rowe, Las Vegas, N. M.; Samuel Spencer, Baltimore, Md.; as Associate, William Henry Barnes, Philadelphia, Pa.; as Juniors, John Anderson Bense, New York City; Carlos Ferrer Ferrer, New York City; Maxwell Smith, New York City.

The deaths of Mr. Emile Malézieux, Hon. M. Am. Soc. C. E., of Paris, France, on May 20th, 1885, and of Mr. Henry H. Gorrington, Assoc. Am. Soc. C. E., of New York, were announced.

A paper by W. Howard White, M. Am. Soc. C. E., on European Sewage and Garbage Removal, was read by the writer and discussed.

SEPTEMBER 16TH, 1885.—The Society met at 8 P. M., Vice-President G. S. Greene, Jr., in the chair; John Bogart, Secretary. The paper by Edward Bates Dorsey, M. Am. Soc. C. E., on English and American Railways Compared, read at the last Convention, was discussed.

OCTOBER 7TH, 1885.—The Society met at 8 P. M., President Frederic Graff in the chair; John Bogart, Secretary. Ballots for membership

were canvassed and the following candidates declared elected: As members, William Price Craighill, Corps of Engineers, U. S. A., Baltimore, Md.; Hiram Stevens Maxim, London, England; as Juniors, Bernard Frank Booker, of Brooklyn, N. Y.; Thomas John Brereton, of Altoona, Pa.; Joseph Maxwell Carrère, of New York; Charles P. Matlock, of San Antonio, Texas.

The ballot upon the following resolution, presented at the last Convention, was canvassed:

Whereas, The relation which the form of the head of a rail should bear to the section of a car-wheel tread and flange has recently been in dispute, it being asserted on the one hand, that they should have as long a line of contact as possible, and on the other hand, that such long contact would be dangerous and injurious; and

Whereas, The question raised by this diversity of view is of direct importance to many members of this Society, as well as to the public interest, and hence is one which this Society may appropriately consider through committee; therefore be it

Resolved, That a committee of five members of this Society be appointed by the President to consider and report to the Society on the proper relation to each other of the sections of rails and wheels; to what extent and at what points it is expedient that their sections should be such as to bring them normally in contact; and to what extent and at what points it is not expedient that they should be so in contact; and that the committee be instructed to seek information from all those who are known to have given the subject attention.

On this resolution there were 189 affirmative votes and 9 negative votes. This resolution having been submitted to the Society by letter-ballot, in accordance with the provisions of the by-laws, and having received a majority of all votes cast, was declared duly carried.

The deaths of Mr. Wilmon W. C. Sites, M. Am. Soc. C. E., on October 1st, 1885, and of Mr. Thomas C. Durant, F. Am. Soc. C. E., on October 5th, 1885, were announced.

The Board of Direction announced that, in accordance with the rules for the award of the Norman Medal, the following named members had been designated as the Board of Censors to make the award for the year terminating August 1st, 1885: Messrs. G. Bouscaren, Robert Moore and W. Howard White.

Also, that in accordance with the rules for the award of the Rowland Prize, the following named members had been appointed as the committee to make the award for the year terminating August 1st, 1885: Messrs. Mendes Cohen, Edward P. North and the Secretary of the Society.

The President announced that, under the provisions of the following resolution, adopted at the last Convention (Proceedings, Vol. XI, p. 94):

Resolved, That the President be authorized to appoint a committee, to consist of seven members of the Society, which committee shall be instructed to consider the matter of making such changes in the organi-

zation of the Society as may be desirable, in connection with the subject of local engineering societies or clubs, and of sections or chapters of the Society; also to take into consideration the future policy of the Society in relation to the admission of branches of engineering not now generally represented in the Society; and that the committee be authorized to confer directly with the members of the Society and with local organizations; the committee to report the information obtained and conclusions, if any, reached by the committee.

The following named members had been appointed such committee: Messrs. A. M. Wellington, J. James R. Croes, Charles Paine, O. Chanute, Charles Macdonald, William Metcalf and William H. Bradley.

The Board of Direction presented circulars from a committee of the Civil Engineers' Club, of Cleveland, appointed "to consider and report what action, if any, is advisable in the matter of obtaining the passage of new laws which shall provide for the better condition of Civil Engineers employed on Government works other than military," together with a suggestion that this Society should send an accredited delegate or representative as a member of a central committee to consider this subject.

The Board of Direction also presented the following letter, which had been sent in reply by the Board:

OCTOBER 6th, 1885.

WM. T. BLUNT, Esq.,

Secretary of Committee Civil Engineers' Club of Cleveland.

DEAR SIR,—The Board of Direction of the American Society of Civil Engineers, having at its last meeting considered the circular-letter issued by your committee, appointed "to consider and report what action, if any, is advisable in the matter of obtaining the passage of new laws which shall provide for the better condition of Civil Engineers employed on Government works other than military," together with the suggestions made by your committee, that this Society should send an accredited delegate or representative as a member of a central committee to consider this subject; I am instructed to reply, that, at a convention of this Society in 1881, a specially appointed committee presented a report, to the effect that it might be inexpedient for the Society to place itself in the position of advocating, before Congress, the claims of a certain class of its membership in seeming conflict with any other class whose interests may be in a different direction; that it might be well questioned whether the Society, as a body, should commit itself to a line of action which might be construed as in the least inimical to the professional interests of any of its members; that the objects for which the Society was instituted, show that there should never be the least attempt at discrimination in favor of a particular class of members to the detriment of others. And the committee was of the opinion that the Society might with propriety decline to consider the subject further.

This report of the committee was accepted by the Society, and the committee discharged.

In view of this precedent, and of the clear opinion held by so many of our members, that action upon such a subject, if taken at all, should be taken by individuals, as such, and not by the Society; and also in

view of the fact that the American Society of Civil Engineers is national in its scope and organization; its membership distributed over the whole country; and including individuals with widely varying interests and associations, and of many different classes of professional practice, some of whom might well desire that the Society should take action with reference to their own special interests or wrongs, if a precedent of that nature should be established; the Board of Direction is of the opinion that it would not now be proper to appoint a delegate under the suggestions of your circular.

Very truly yours,

JOHN BOGART,
Sec. Am. Soc. C. E.

A paper by Edward Bates Dorsey, M. Am. Soc. C. E., comparing the Operating Expenses of English and American Railroads, being a supplement to the paper presented at the Convention, was read by the writer and discussed.

OF THE BOARD OF DIRECTION.

JUNE 4TH, 1885.—Applications were considered. Arrangements for the Convention were made. Under the provisions of the By-Laws, it was determined that a meeting of the Society be held, for the canvass of ballots for membership, on the first Wednesday of July, 1885, and that thereafter the meetings be suspended till the first Wednesday in September. Appropriations were made.

JULY 30TH, 1885.—Applications were considered. The issue of a letter-ballot was directed, on the appointment of a Committee, under the provisions of a resolution passed at the Convention, in relation to Railway Wheels and Rails, and referred to the Board under the By-Laws. Appropriations were made.

SEPTEMBER 2D, 1885.—Applications were considered. Action was taken, in accordance with the proceedings of the Convention, in replying to a communication from the Secretary of the Committee on a Uniform System for Tests of Cements. Appropriations were made.

SEPTEMBER 30TH, 1885.—Applications were considered. The preparation of a memorial was directed, in accordance with the resolution passed at the Convention (Proceedings, Vol. XI, p. 98). Under the rules, the following named members were designated as the Board of Censors to award the Norman Medal for the year terminating August 1st, 1885: Messrs. G. Bouscaren, Robert Moore and W. Howard White. Also the following named members were appointed, with the Secretary, the Committee to award the Rowland Prize for the same year: Messrs. Mendes Cohen and Edward P. North.

Circulars from a Committee of the Civil Engineers' Club, of Cleveland, were considered, and a reply adopted (see page 107 above). Appropriations were made, and financial business transacted.

OCTOBER 7TH, 1885.—Financial business was transacted.

MEMOIRS OF DECEASED MEMBERS.

JOHN BLOOMFIELD JERVIS, Hon. M. Am. Soc. C. E.

DIED JANUARY 12TH, 1885.

In the death of John Bloomfield Jervis, at Rome, N. Y., on the night of January 12th, the country lost another of those remarkable men bequeathed to this generation by the latter part of the eighteenth century, whose talents and energies have for seventy years been directed toward building up the wonderful system of internal improvements which marked the history of the nation during the present century.

Mr. Jervis was born at Huntington, Long Island, December 14th, 1795, and was consequently in his 90th year at the time of his death. His father was Timothy Jervis, a carpenter by trade, and a resident of Huntington. His mother was Phœbe Bloomfield, of Woodbridge, N. J. The brother of Mrs. Jervis, John W. Bloomfield, went to Fort Stanwix, now Rome, N. Y., from New Jersey, to act as agent for and to look after a large tract of land in that vicinity, which resulted in the purchase for himself and two or three others of the "six thousand-acre tract." He soon after settled in what is now the town of Annsville, which was named after his wife. About 1812 he removed to Rome, purchased a farm, which included the homestead of Mr. Jervis, and lived and died in a house which then occupied the site of Mr. Jervis' late residence. His death occurred in 1849, at the age of eighty-four. He was widely known, and universally honored and esteemed.

In 1798, Timothy Jervis moved to Fort Stanwix, which was chiefly prominent as having a navigable canal of about two miles in length, connecting the Mohawk River with Wood Creek. By connecting improvements in the form of locks and dams on the Mohawk River and Wood Creek, it formed part of a system of improvements connecting the natural navigation through a large portion of the State of New York. By these means barges or bateaux passed from Schenectady, on the Mohawk, to Ithaca, at the head of Cayuga Lake. The country was at this time mostly a wilderness of heavy timber, and Timothy Jervis soon became interested in a saw-mill, which was attended by himself and his sons. John B. Jervis was the oldest of seven children and had

the experience of the trials of a settlement in a new country. What education he had was obtained at the common schools of that day, which he attended until he was fifteen years of age. There were then no public schools sustained in whole or in part by the State. Between the ages of fifteen and twenty-two he spent his summers in managing a team and attending the saw-mill, with occasional farm work, and during the winters he was engaged in hauling saw-logs and wood.

In 1817, the construction of the Erie Canal was commenced, and the work afforded employment and furnished facilities to a large class who had theretofore followed other pursuits. Benjamin Wright, more generally known as "Judge" Wright, was Chief Engineer in the construction. Judge Wright resided in Rome, and therefore knew Mr. Timothy Jervis and his sons. Needing an axman, he applied to Mr. Jervis, who suggested that he should take John, which was the beginning of what afterward became the remarkable engineering career of John B. Jervis, who then turned his attention to the study and practice of surveying and engineering. Dexterous with an ax, apt and ambitious to learn, ready to do all and more than was required, he was soon promoted to the position of rodman in the survey, at \$12 per month, in which he reached such proficiency, that in two years he was made Resident Engineer on seventeen miles of the canal, extending from Canastota, Madison County, to Limestone Creek, in Onondaga County, at a compensation of \$1.25 per day. Mr. Jervis was then about twenty-five years of age, and although the young engineers of to-day might smile at an offer of \$1.25 per day, that position and salary, sixty-five years ago, were considered very desirable and lucrative.

Mr. Jervis records, in some notes which he has left for the purpose of memoir, that after filling a winter engagement for weighing stone for locks, he started for Rome, a distance of forty miles, on foot, traveling four miles on the evening of the first day, to a village where he and his associates spent the first night, and thence started at daylight to walk thirty-six miles to Rome, over melting snow, which made the traveling very heavy and disagreeable, reaching Rome about 9 o'clock in the evening, pretty well fatigued, but hardly the worse for it the next day. During this period Mr. Jervis was under the direction of Judge Bates as chief of the party, and Canvass White, well known among New York engineers, as the principal assistant.

In the spring of 1820, he became well acquainted with Henry Seymour (father of Hon. Horatio Seymour), who was one of the Canal Commissioners, and with whom Mr. Jervis had had frequent intercourse in relation to his duties. In the spring of 1821, Mr. Jervis was assigned the position of Resident Engineer to the division extending from "The Nose" to opposite the village of Amsterdam, about seventeen miles; Mr. Seymour being the Commissioner of that division. He retained the charge of this division until the close of 1822, when it was mostly

completed, and the party was disbanded, except himself. He was retained to aid in the settlement of the accounts of the contractors, which occupied his time for the balance of the year. This work was discharged with such acceptability that he was retained by Commissioner Seymour, in the opening of the season of 1823, to take charge of such work as still remained to be done on the canal between the Minden dam and the Upper Mohawk aqueduct, a section of fifty miles. It was then made his duty to organize parties of men to superintend the work of repairs and such incidental improvements as were found necessary to bring the section into use for navigation.

The custom was, at that day, to stop small leaks in the canal by dumping in clay, but Mr. Jervis records that, "finding the clay not satisfactory in the leaks that occurred, I made trial of fine gravel intermixed with sharp sand, which, while it did not fully stop the leak at the first application, was not sensibly carried away, and the interstices being small they were gradually filled up, and the work became tight," which marked a decided advance in the mode of repairing leaks, and was illustrative of the care with which Mr. Jervis always investigated details. In the spring of 1825 the canal was opened to Albany, and Mr. Jervis was continued as the Superintendent Engineer on the same division. During that year and until March, 1825, he had full charge of the entire section from Amsterdam to Albany, and all accounts for labor and material passed through his hands. He records the fact that the actual cost of operating the section of fifty miles for one year, including lock tenders and all expenses, except those for the collection of tolls, was at the rate of \$600 per mile.

Mr. Canvass White, the principal Assistant Engineer, left the State service for other work in 1823, and as Judge Wright, the Chief Engineer, had many calls for his service on canal enterprises in other States, the entire responsibility for the section referred to was thrown upon Mr. Jervis and Mr. Seymour, the Canal Commissioner.

After seven years' employment on the Erie Canal, Mr. Jervis closed his services by resignation early in the month of March, 1825, very much to the regret of Mr. Henry Seymour, who gave him warm testimonials. Mr. Jervis went to New York and had an interview with Judge Wright, who had entered into an engagement with the Delaware and Hudson Canal Company, which resulted in the engagement of Mr. Jervis as Chief Engineer of that company, with Judge Wright as Consulting Engineer. Preliminary surveys and estimates had been made for the construction of a water route, partly canal and partly slack-water; but Mr. Jervis, after a careful investigation, decided against most of the slack-water plan, his decision being approved by Judge Wright. Near the close of 1827 Judge Wright resigned, and Mr. Jervis was appointed to succeed him, and remained in charge of the work until 1830. During this time he constructed the inclines of the Carbon-

dale Railroad and ordered from England the "Stourbridge Lion," the first locomotive imported into this country, which, with two others, were ordered about a year before the famous trial on the Liverpool and Manchester Railway, indicating Mr. Jervis' extraordinary foresight and courage. This locomotive, Mr. Jervis states, was bought under an order from him for a locomotive which should not exceed $5\frac{1}{2}$ tons in weight. The "Stourbridge Lion" actually weighed 7 tons, exclusive of coal and water, with the proper complement of which its weight was 8 tons, and consequently in excess of the weight which the trestles of the Carbondale road were built to sustain, and hence the locomotive could not be used. But the criticism that the trestles were too weak for their intended purpose is negatived by the fact that they bore in the first 20 years the transit of about 5 000 000 tons of coal. Mr. Jervis is certainly entitled to the credit of having introduced the first locomotive on the American continent, and its failure to be serviceable was not due to any error of his.

The works of the Delaware and Hudson Canal and Railroad were completed in the fall of 1829, and a few boats loaded with coal were transported to tide-water on the Hudson. Mr. Jervis records that at this time he employed Mr. John H. McAlpine to superintend the construction of machinery, who introduced his son, William J. McAlpine, then about 16 years of age, and requested a place for him. Mr. McAlpine's widely-known engineering reputation started with that introduction.

In 1830 Mr Jervis was appointed Chief Engineer of the Albany and Schenectady Railroad, the first railroad constructed in the State of New York.

Mr. Jervis subsequently became Chief Engineer of the Schenectady and Saratoga Railroad, and while occupying this position, in 1830, his attention was drawn to the inadequacy of the locomotives of the then existing plan for high speed. This was especially noticeable in the action of the second engine imported for the Albany and Schenectady Railroad, called the "John Bull," the first having been named the "De Witt Clinton." Mr. Jervis says of the "John Bull:" "It being placed on four wheels, the overhanging caused a sharp and disagreeable motion of the engine. This circumstance, with others, induced me to continue my researches for a remedy for the weight, and to secure a more steady motion for the engine, and I was finally led to the plan of a four-wheeled truck under the forward portion of the engine as a support for that end." Mr. Jervis records that his mind was made up in regard to the form of this truck in the summer of 1830, although he had no opportunity to construct an engine of that plan until 1832, when the first engine having one pair of drivers and a four-wheeled truck, manufactured by the West Point Foundry Association, was run on the Mohawk and Hudson Railroad, by David Mathews, till a speed of 50

miles per hour was attained. An engraving in the *Railroad Gazette* for February 3d, 1872, shows the engine so designed in 1831. It is scarcely necessary to add that this precise form of truck is now in use on over 125 000 miles of railway in this country, as well as on many thousand miles in other countries. After the completion of the two railroads above mentioned, in 1833 Mr. Jervis was engaged by the Canal Commissioners as Chief Engineer of the Chenango Canal, 98 miles long, with 100 locks. On this canal, for the first time in this country, resort was had to artificial reservoirs for the supply of its summit level with water, and Mr. Jervis was the originator of the method. In 1835 the work of the enlargement of the Erie Canal was attempted, and Mr. Jervis was called upon to make surveys and estimates on the eastern section. He proposed corrections for many errors in its original construction, and at Little Falls he wholly rearranged the locks.

In October, 1836, he accepted the unsolicited offer of the position of Chief Engineer of the Croton Aqueduct, considered at the time of its completion as the greatest example in the world of hydraulic engineering skill. The difficulties with which Mr. Jervis had to contend, caused by the ignorance and sometimes by the malicious criticism of the opponents of the aqueduct, greatly tried his patience and skill, but he succeeded in holding the position until the work was completed; and it deserves to be here recorded, as an example for engineers, and for the constructors of public works of this day, that the aqueduct constructed to supply the then population of 250 000, with a view to ultimately supplying a population of 500 000, starting with the delivery of 12 000 000 gallons per 24 hours, is now supplying 95 000 000 gallons daily to a population of 1 400 000, and that the cost of the whole work, exclusive of the High Bridge, estimated by Mr. Jervis on January 2d, 1838, at \$8 464 033, was completed by a total expenditure to January 31st, 1848, of \$8 766 626, an excess of cost over the original estimate of but \$302 593, or about 3.7 per cent., which excess is almost entirely accounted for by the loss of the partially completed Croton dam on January 8th, 1841, and by the increased cost of land damages, outside of which items we have the personal authority of Mr. Jervis for stating that the excess in cost over the original estimate was less than one per cent.

Mr. Jervis was appointed in 1846 Consulting Engineer on the Boston water supply, which position he held until 1848, during which time the Cochituate Water-works were located and partially constructed. The water-works at Port Jervis, which place was named after Mr. Jervis by the directors of the Delaware and Hudson Canal Company, were constructed under his supervision, as were also the Rome Water-works, in 1868. In 1847 Mr. Jervis was made Chief Engineer of the Hudson River Railroad, which position he held until 1849, and was Consulting Engineer until 1850. During his incumbency the Hudson River Railroad was completed from New York to Poughkeepsie, which included

all the difficult portions of the work. The obtaining of capital for its construction was greatly facilitated by Mr. Jervis' well known caution in recommending any scheme.

In 1850 Mr. Jervis went to Europe, where he spent four months, and was received with great honor on account of his engineering achievements. While there he was invited by Robert Stephenson to witness the launching of one of the large tubes for the bridge over the Menai Straits, of which he says: "The spectacle was highly interesting in itself, and was followed by an invitation to dine with a party of English engineers, an occasion I enjoyed very much." On his return he engaged as Chief Engineer in the construction of the Michigan Southern and Northern Indiana Railroad, now the western portion of the Lake Shore and Michigan Southern, and then one of the most prominent public works of the country, about 66 miles of which, originally known as the Erie and Kalamazoo Railroad, had been constructed by the State of Michigan with a wooden rail and iron plates. Mr. Jervis continued his connection with this company until the spring of 1858. During the summer of 1851 he was made President of the Chicago and Rock Island Railway, which was constructed from Chicago to Davenport, 180 miles, and brought into use about 1854. From the spring of 1858 until the spring of 1861, Mr. Jervis was without professional engagement. In the fall of 1861 he was appointed General Superintendent of the Pittsburgh, Fort Wayne and Chicago Railway, then just emerging from a condition of practical bankruptcy. The bondholders had foreclosed and sold the road and the company had been reorganized, acknowledging, however, all classes of stockholders and creditors to the full amount of their original interest. The road had been cheaply constructed and inadequately maintained, and was in poor condition. The stock was then selling at 8 per cent., and not long after Mr. Jervis entered on the management a stockholder inquired of him if it would be advisable to sell at 20 per cent. He held the position of General Superintendent until March, 1864, when he resigned to take that of Chief Engineer, which position he occupied until 1866, and was Consulting Engineer of the company until 1872. During the period of his superintendence the track and machinery were greatly improved, the latter being very much increased in quantity, as well as improved in quality. During his administration all the fixed liabilities of the company were promptly met, and soon after his resignation as General Superintendent the company paid a semi-annual dividend of 5 per cent. The foundation was laid by Mr. Jervis for the extraordinary success with which the company's affairs have been so ably managed by his successors.

About 1872, Mr. Jervis was consulted by the parties who were contemplating the building of the Cazenovia and Canastota Railroad, who submitted to him an estimate which they had procured of the cost of

building the proposed line, asking his opinion thereof. With his usual caution and foresight, he recommended that they double the amount of the estimate and not undertake the construction until they were prepared to expend the increased amount. This somewhat delayed the construction of the road, the cost of which, when completed, fully sustained Mr. Jervis' views. In 1868 he was made one of the first trustees in the organization of the Rome Merchant Iron Mill Company, which position he occupied until the time of his death. The operations of the company for the first two years resulted in serious loss, and threatened its bankruptcy; but in 1872 Mr. Jervis came to its rescue with a large loan of his personal funds, and assumed the position of secretary, which he held at the time of his death. Under his wise and prudent administration—for his was the keynote in the management—the company retrieved its former errors, and is now on a prosperous footing.

It will be seen, therefore, that for more than seventy years Mr. Jervis has been an active worker, and all his work has been of a character to leave an enduring impression on the country. Since his practical retirement from active railroad management, in 1866, he found time to write a book on "Railway Property," and another on "The Question of Labor and Capital." In 1877 he wrote a paper, published in the *International Review*, advocating the use of locomotives for towing boats on the Erie Canal—an unexampled evidence of progress at the age of eighty-two. In 1879, at the request of the Young Men's Christian Association of Rome, Mr. Jervis wrote a lecture on "Industrial Economy," which was delivered before that Association. He was then past eighty-three years of age, yet that lecture showed his mind to be as clear, strong and vigorous as in the days of his prime. In 1878, Hamilton College conferred on him the degree of LL.D.

His last professional work, and that which most fully illustrates the extraordinary character of his professional ability, and the esteem in which he was held by his engineering contemporaries, was his employment as a Consulting Engineer on the proposed new Croton Aqueduct, by the late Isaac Newton, Chief Engineer, and by Mr. E. S. Chesbrough, then Consulting Engineer for that work. Upon this business Mr. Jervis came to this city in December, 1881, and remained here some two weeks, consulting daily with Messrs. Newton and Chesbrough, and on his return to Rome he took with him various plans, and made a report substantially indorsing the plans proposed by Messrs. Newton and Chesbrough. That he should be equal to this work at the age of 86 was sufficiently remarkable, but that he should be considered as worthy of being consulted by men themselves veterans in the profession, is a still more extraordinary evidence of the exceptional character of the man.

Mr. Jervis' strongest trait was his absolute conscientiousness, exemplified in every walk of life. His career was an example of the most

sterling integrity, and while he had many critics and opponents during his professional career, the tongue of slander never wagged against him. His life was a grand example to the young in all professions, and particularly to those of his own profession, who meet with so many temptations and discouragements; and a study of his memoirs, which will be published at length at an early day, will enable many a man to avoid the rock upon which so many barks have foundered.

His devotion to the good of his fellows is evidenced by his will, in which he bequeathed his valuable library and about one-third of his estate to erect a building for a library and lecture-room, for the use of the people of Rome, so long his place of residence.

Mr. Jervis was twice married. In 1834 he married the daughter of the late George Brayton, of Weston, who died in 1839. Two years later he was married to Eliza R. Coates, who survives him. His health for the greater part of his life was remarkably good. During the past year his strength had been gradually failing, and he told one of the members of the committee at his last interview in November that his work was done. He had no special disease; the machine had simply worn out from old age. When one of the members of the committee talked with him, only two months before his death, his mind was as clear and his faculties as undimmed as at the beginning of their acquaintance, 24 years since, and it was only for a day or so before his death that mind and memory failed him.

In the death of John Bloomfield Jervis the whole community may truly mourn; for a great engineer, a good man, and a valuable citizen has departed. The important and enduring works on which he had spent a lifetime will elevate and benefit the human race long after his remains shall have crumbled to dust, and his fame as one of the greatest of American engineers will survive the age in which he lived. But, above all, the remembrance of the industry, energy and perseverance by which he overcame all obstacles, and raised himself from the lowest to the highest rank in his profession, his purity of life and his honorable and high-minded character, will survive as an example and an incentive to the young men of America and encourage them to emulate his virtues.

Mr. Jervis became a Member of the American Society of Civil Engineers, December 4th, 1867. He was made an Honorary Member of the Society, December 2d, 1868.

JOHN AVERY, M. Am. Soc. C. E.

DIED JANUARY 30TH, 1884.

John Avery was born at Lowell, Mass., July 15th, 1830, and was graduated at Harvard College in 1850, he being the sixth John Avery, in regular descent from father to son, who had there received the degree of A. B., viz., in 1706, 1731, 1759, 1793, 1819 and 1850.

After graduation he traveled with his father in Europe, and, returning, commenced the profession of civil engineering in the office of Mr. James B. Francis, M. Am. Soc. C. E. He was afterwards with Mr. William E. Worthen, M. Am. Soc. C. E., in the surveys for the New Rochelle and Mott Haven Railroad; in the construction of the Cos Cob bridge on the New York and New Haven Railroad, and afterwards in charge as engineer on this road. He was an assistant to Mr. James Laurie, M. Am. Soc. C. E., in the surveys of a railroad in Nova Scotia, and in his examination and report on the Troy and Greenfield Railroad, and the Hoosac Tunnel. He had charge of the surveys and examination of the obstructions, natural and artificial, of the Sudbury River, in the employ of the State of Massachusetts. He was an assistant engineer on the Brooklyn Water-works.

Taking up his residence in New York City, he became a member of the 7th Regiment, and went with it to the defense of Washington and Baltimore, and always continued his military connection in "The Veterans."

In 1865 he entered the service of the Croton Aqueduct Department, and had charge of the construction of the reservoir at Ward's Island. He was transferred to the Bureau of Sewers of this department, and continued in the same work under the Department of Public Works till his decease. He met his death January 30th, 1884, by being struck by a locomotive on the New York Central and Hudson River Railroad while on his way to the station to take the cars.

Mr. Avery was singularly quiet and retiring in manner, but educated and refined in his tastes, with an enthusiastic love of field sports. He made many friends, not only among those of his profession, but also among those with whom he was brought in contact, and once made they were retained.

Mr. Avery was elected a Member of the American Society of Civil Engineers, December 4th, 1867.

Committee to prepare Memoir: Mr. William E. Worthen, M. Am. Soc. C. E.; Mr. G. S. Greene, Jr., M. Am. Soc. C. E.; and Mr. Charles H. Myers, M. Am. Soc. C. E.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

	Date of Election.
ANDREWS, DAVID HERBERT.....Proprietor Boston Bridge Works, 13 Pemberton square, Boston, Mass	Sept. 2, 1885.
AULLS, HERBERT LEANDER.... (Care Union Pacific R'y), Omaha, Nebraska.....	July 1, 1885.
BISHOP, THOMAS SPARKS.....Engineer Russell and Erwin Man- ufacturing Co., New Britain, Conn.....	Sept. 2, 1885.
COOLEY, GEORGE WASHINGTON..42 South Third st., Minneapolis, Minn.....	" " "
CRAIGHILL, WILLIAM PRICE...Lieut.-Col. Corps of Engineers, U. S. A., 378 St. Paul st., Balti- more, Md.....	Oct. 7, 1885.
HARRISON, EDLOW WINGATE...Rooms 74 and 75, Fuller Build- ing, Jersey City, N. J.....	June 3, 1885.
HOAG, SIDNEY WILLETT, JR....128 East One Hundred and Fif- teenth st., New York City.....	Sept. 2, 1885.
PARET, MILNOR PECK.....Assistant Engineer Reading and Pottsville R. R., Harrisburgh, Pa.....	" " "
ROWE, SAMUEL McMATH.....Resident Engineer Las Vegas Division Atchison, Topeka and Santa Fé R. R., Las Vegas, N. M.....	" " "

ASSOCIATE.

BARNES, WILLIAM HENRY.....2121 Walnut st., Philadelphia, Pa.....	Sept. 2, 1885.
---	----------------

JUNIORS.

BENSEL, JOHN ANDERSON.....207 West Fifty-sixth st., New York City.....	Sept. 2, 1885.
FERRER, CARLOS FERRER.....Morris Dock, New York City,....	" " "
SMITH, MAXWELL.....44 East Sixty-fifth st., New York City.....	" " "

CHANGES AND CORRECTIONS.

MEMBERS.

ALLEN, C. FRANK.....	Socorro, New Mexico.
ALLEN, JAMES P.....	5 Bull st., Charleston, S. C.
BLAND, JOHN C.....	257 South Fourth st., Philadelphia, Pa.
BURPEE, MOSES.....	Chief Engineer New Brunswick R'y, Woodstock, N. B., Canada.
CURTIS, WENDELL R.....	Rockland, Plymouth Co., Mass.
DE FUNIAK, FREDERICK.....	204 East Chestnut St., Louisville, Ky.
FISHER, CHARLES H.....	Lansingburgh, N. Y.
FLAGG, J. FOSTER.....	(Care Charles & Lindsay), 145 Broadway, New York City.
FRITH, ARTHUR J.....	(Care Reeves Bros.), Niles, Ohio.
FULLER, SIDNEY T.....	16 Chester Square, Boston, Mass.
GREENE, FRANCIS V.....	Capt. Corps of Engineers, U. S. A., West Point, N. Y.
HOOD, WILLIAM.....	Chief Engineer Southern Pacific Co., Pacific System, San Francisco, Cal.
JEWETT, WILLIAM C.....	Resident Engineer Cincinnati, New Orleans and Texas Pacific R'y, and, Alabama Great Southern R. R., Chattanooga, Tenn.
MCCOOL, DANIEL.....	General Manager St. Joseph and Grand Island R. R., St. Joseph, Mo.
MOSMAN, ALONZO T.....	Beverly, Mass.
O'ROURKE, JOHN F.....	Engineer in charge Wisconsin River Bridge, Chicago, Burlington and Northern R'y (P. O. Box 62), Prairie du Chien, Wis.
PARKHURST, HENRY W.....	Omaha, Nebraska.
PHINNEY, HENRY W. B.....	170 East One Hundred and Eleventh st., New York City.
STROBEL, CHARLES L.....	Consulting Engineer Keystone Bridge Co., Home Insurance Building, Chicago, Ill.
WATKINS, FREDERICK W.....	Division Engineer Aqueduct Commissioners, 118 East One Hundred and Fifteenth st. New York City.
WHITFORD, OSCAR F.....	Superintendent of Mines for the Santa Barbara Silver Mining Co., Santa Barbara, Chihuahua, Mexico.

JUNIORS.

BISSELL, FRANK E.....	Road Master Fort Worth and Denver City R'y, Fort Worth, Texas.
BLANC, FREDERIC N.....	14 West Twenty-third st., New York City.
FRANCIS, GEORGE B.....	(Care W. H. Atwood, Div. Eng. S. P. R. R.), Fannettsburg, Pa.

DEATHS.

- DURANT, THOMAS C.....Elected Fellow November 13th, 1870; died October 5th, 1885.
SITES, WILMON W. C.....Elected Member November 6th, 1878; died October 1st, 1885.
-

Subscription to Building Fund not previously acknowledged.

Newell, John.....\$100.00

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—November, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

OCTOBER 21ST, 1885.—The Society met at 8 p. m., Vice-President G. S. Greene, Jr., in the chair. A paper by Mr. Walton W. Evans, M. Am. Soc. C. E., on Abt's System of Railways for Steep Inclines, was read and discussed.

NOVEMBER 4TH, 1885.—The Society met at 8 p. m., Vice-President G. S. Greene, Jr., in the chair. The following candidates were elected as Members: Edward Sherman Gould, Yonkers, N. Y.; Benjamin Dwight Green, Oswego, N. Y.; Simpson Clark Heald, Worcester, Mass.; Thomas Franklin Richardson, El Paso, Texas; and as Fellow of the Society, Henry Coddington Meyer, New York City.

The following amendment to the By-Laws was regularly proposed: To amend Section 24, 5th Clause, by substituting the word "December" for the word "November." This will be issued for letter-ballot.

The Board of Direction was requested to issue a circular, calling the attention of Members to the desirability of adding to the Junior Membership, and of exercising their personal influence with young men towards inducing them to make application in the ordinary way for Junior Membership.

A paper by Mr. F. Collingwood, M. Am. Soc. C. E., on the Behavior of Cement-Mortars Under Various Contingencies of Use, with a Brief Discussion of Several Tests, was read and discussed.

OF THE BOARD OF DIRECTION.

OCTOBER 28TH, 1885.—Applications were considered. Action was taken as to Members in arrears for dues.

NOVEMBER 4TH, 1885.—Applications were considered. Action was taken as to Members in arrears for dues.

MEMOIRS OF DECEASED MEMBERS.

CHARLES AUGUSTUS SMITH, M. Am. Soc. C. E.

DIED FEBRUARY 2D, 1884.

Charles Augustus Smith was born in St. Louis, Mo., on the first day of October, 1846. His mother dying soon afterwards—probably in the epidemic of cholera in 1849—he was placed in the care of his mother's sister, in Newburyport, Mass., the native State of both his parents, and there remained during his youth.

After graduating in the English course in the Boys' High School in Newburyport, in 1862, he began his professional work in March, 1863, in the office of Mr. J. B. Henck, civil engineer, in Boston. In the following year he was a leveler on the Boston, Hartford and Erie Railway. In 1865 he was an assistant engineer on the Boston and Providence Railway, and then chief assistant in the City Engineer's office at Springfield, Mass. By this time he began to feel the need of more thorough technical training, and, in October, 1865, entered the Sophomore Class in the Massachusetts Institute of Technology, then first opened, and was a member of the first graduating class in 1868. During his course in the Institute he kept his residence in Newburyport, going daily to and from Boston, forty miles distant.

His vacations were all spent in professional work. Thus, in 1866, he was transit-man on a railroad survey, and in 1867 was employed in the office of Mr. J. B. Francis, Past President Am. Soc. C. E., engineer of the locks and canals at Lowell, Mass., where, also, he spent a short time in 1868. In the latter part of this year he became an assistant engineer on the location of the Union Pacific Railway in Utah, where he was associated with Mr. E. P. North, M. Am. Soc. C. E., and the late Mr. John R. Gillis, M. Am. Soc. C. E.

In 1869 he formed a business partnership with Prof. J. B. Henck, of Boston, and during this connection was division engineer on the Blue Ridge Railway in North Carolina. Thence, in 1870, he was called back to St. Louis, the place of his birth, to become instructor in civil engineering in Washington University. Shortly afterwards he was elected to the full professorship of civil and mechanical engineering, a position which he held until June, 1883, when compelled by failing health to resign.

Whilst connected with the University, he found time for much professional work. He was for several years consulting engineer for the Iron Mountain Railway Company, and designed for them the shops at De Soto. He was also consulting engineer for Shickle, Harrison & Co., iron manufacturers, for whom he designed the roof trusses of the St. Louis Merchants' Exchange, and several iron bridges. In 1879 he spent his summer vacation at Minneapolis, as resident engineer of the Baltimore Bridge Company, at that time building the Minnehaha bridge over the Mississippi River, for the Chicago, Milwaukee and St. Paul Railway.

In 1880 he made a competitive design for pumping machinery for the water-works at Richmond, Virginia, which gained the first prize of \$500, and has since been used in construction of the works. He was also consulting engineer during the construction of the water-works at Hannibal, Mo., and at St. Charles, Mo.

His last professional work was the preparation of the two books on steam engineering, which have been published since his death, under the titles of "Steam Making" and "Steam Using." These were both written during the last two years of his life and after the appearance of the disease, a cancerous tumor, which finally caused his death, and are sad memorials of a most gallant struggle against depressing influences by which most men would have been unnerved. When his strength had waned until it was no longer equal to the work of teaching, he went back to Newburyport, his old home. He did not, however, cease working, but, lying on his bed or propped up in a chair, pressed on to a conclusion his record book, and did not lay down his pen until his self-appointed task was done. He died about a week afterwards, on the 2d of February, 1884, leaving his wife and three children surviving.

Professor Smith was Secretary of the Engineers' Club of St. Louis for more than eleven years, from September, 1871, to February, 1883; and a Member of the American Society of Civil Engineers from April 7th, 1880, until his death. He was also a Member of the American Water-works Association, and of the American Railway Master Mechanics' Association.

Personally he was much beloved by his pupils and associates, who will long cherish his memory as that of a bright, cheerful and large-hearted man, earnestly devoted to noble ends.

EDWARD YORKE, M. Am. Soc. C. E.

DIED MAY 28TH, 1884.

Edward Yorke was born at Florence, Alabama, October 8th, 1835. At the early age of eleven he was sent to France by his father, who was a prominent and wealthy sugar-planter, to be educated, remaining there for eleven years, until 1856. He entered the Sarbonne (University of Paris), graduating as Bachelor of Letters in May, 1852, and as Bachelor of Sciences in July, 1853. He then entered the *Ecole Central des Arts et Manufactures*, graduating August 15th, 1856. Toward the close of 1857 he returned to the United States, and was engaged as assistant engineer by the Louisiana Tehuantepec Railroad Company, the first corporation which attempted the construction of a railroad across the Isthmus of Tehuantepec, in which his father held a large financial interest. He was speedily placed in charge of a party on the surveys, but little or nothing was done towards construction, and he ultimately remained on the Isthmus for some time, looking after the business interests of his father and others in the stage line, which had been established *pro tem.* across the Isthmus, and which at one time had a heavy traffic.

Professional and social interests then took him to Mexico, where he remained some years, several of his class-mates being connected with the service of the unfortunate Maximilian. His chief professional duties during this period were as engineer in charge of construction of a division of the Mexican Railway from Vera Cruz to the City of Mexico, a service of no little danger at that time as well as of professional responsibility. The country was in a condition of chronic tumult, and attacks upon the constructing force were frequent. Upon the completion of his division in 1865, Mr. Yorke abandoned his profession for a time, purchasing and engaging in the management of a coffee plantation, with a result which not unfrequently attends enterprises undertaken by engineers outside of the limits of their own profession, to wit, more money went into it than came out of it—although in this case the lack of success was largely due to a combination of unfortunate circumstances, and especially to the unsettled condition of the country.

In 1868 Mr. Yorke went to California, which may be said to have been thereafter his home until the time of his death. In 1868-69 he was engaged on the construction of the Western Pacific Railroad;

spending the next three years in various topographical surveys at San Francisco, and as civil assistant on the harbor works of that city.

In 1872-73, Mr. Yorke was engaged as one of the party of reconnoitering engineers who visited Mexico in company with and in the interests of Generals Palmer and Rosecrans, who were at that time seeking railway concessions in Mexico, and who planted the seeds of the movement which, some eight years later, bore fruit in so many concessions, and in so large a mileage of actual construction, only a portion in the interests of those who had borne the chief part in creating the public sentiment which led to them. This service was at that time one of no little danger and difficulty, notwithstanding which it was performed with a thoroughness which commanded the respect of and rendered great assistance to those who succeeded later in charge of actual construction. The entire area of the Mexican plateau was explored with great thoroughness, and the conclusions drawn subsequently proved in the main correct.

Nothing immediately resulting from this work, Mr. Yorke in 1873 returned to California, and became connected, in succession, during the next four years, with the North Pacific Coast Railroad as division engineer, Dumbarton Railroad (afterwards consolidated with the South Pacific Coast Line) as chief engineer, and as resident engineer of the latter line after the consolidation. In 1877-78 he was professionally engaged in some of the large irrigation works of the State, and from March, 1878, to November, 1880, was chief officer of the State Engineer's Department of California, a department which, owing to the large irrigation works and analogous interests of the State, was one of much importance.

In December, 1880, Mr. Yorke again went to Mexico in the service of the Mexican Central Railroad Company, acting for a few months as one of the locating engineers for the main line, whence, in April, 1881, he was detailed to take charge of the Pacific Line surveys, and in August of the same year was appointed chief engineer of that branch.

In September, 1883, Mr. Yorke resigned his position, work on the line being practically suspended, and returned to California, again entering the service of the public works of the State. In May, 1884, while fording the Santa Anna River, in San Bernardino County, in Southern California, the team became unmanageable, and the wagon was swept away by the torrent, resulting in his death, by drowning, at the age of forty-eight years and seven months.

In 1880, Mr. Yorke married Miss Jenny Heard, daughter of Judge Heard, of Sacramento, Cal. His only daughter, Irma Yorke, died, aged about two years, with distressing suddenness at the City of Guadalajara, Mexico, of scarlet fever, being taken sick on the very day when it had been expected to leave with her for the United States. He left, however, a posthumous child.

Few men are blessed with such charming and attractive personal qualities as was Mr. Yorke—qualities which insured for him the strong friendship of those with whom he was thrown in contact personally or professionally. Born under circumstances which gave him extraordinary social and educational advantages, he was, perhaps, for that very reason little imbued with the restless American craving for advancement and professional success as the chief of all earthly good; but he had a strong professional pride and interest in his work, which served him perhaps in better stead, and the great responsibilities with which he was at various times entrusted, is alone proof that he possessed abilities of no common order. Outside of the direct line of professional duty, perhaps his most marked characteristic was his skill and tact in dealing with men—a quality which is largely born in a man, and not acquired; but to which his many personal characteristics, large experience of men and affairs in many lands, and natural dignity of manner, largely contributed. Those who knew him would find it hard to believe that he was ever discourteous or rude to any human being—a quality which speaks volumes for his character. And we can only regret that untoward circumstances should have prevented his attaining that rounded and long-continued professional career for which his training and experience had in so many ways qualified him.

Mr. Yorke became a Member of the American Society of Civil Engineers, November 1st, 1882.

CHARLES VANDERVOORT SMITH, M. Am. Soc. C. E.

DIED JUNE 30TH, 1884.

Charles Vandervoort Smith was born in the City of New York October 5th, 1837. He received a common school education at Clark & Fanning's Institute in that city. In 1852 he began his professional career with The Manhattan Gas Light Company, of New York, and was associated with that company until his death. From 1852 to 1857 he was employed in the laboratory and as assistant to the late Dr. W. H. Ellet; from 1857 to 1866 in the laboratory and engineer's office; from 1866 to 1871 as assistant engineer and superintendent in charge of the Eighteenth street station, and from 1871 to the time of his death he was the chief engineer of the company.

Committee to prepare Memoir: Mr. John Bogart, M. Am. Soc. C. E., and Mr. Maxwell Smith, Jun. Am. Soc. C. E.

In connection with Mr. William Farmer, he invented and patented a number of important appliances and machines for the improvement of the various processes of gas manufacture, notably the ziz-zag scrubbers, the duplex center seal tower scrubbers, and water distributors for tower scrubbers, all of which were of valuable service in the production of illuminating gas.

In the summer of 1883, very much run down from close attention to business, he passed a few weeks at the Rangeley Lakes, in Maine, and in the fall sailed for Europe. After spending some months there, he returned in the spring of 1884 apparently very much improved in health, and again entered upon the active discharge of his professional duties.

He became suddenly and seriously ill on the morning of June 28th, and passed away in his sleep early on June 30th, an affection of the heart being the immediate cause of death. He leaves a widow and two sons. He was devoted to his family and loved by many friends, to whom his genial disposition especially endeared him. He was a member of the 7th Regiment, N. Y. S. M., and afterwards of its veteran association. He was one of the organizers of the Society of Gas Lighting, and its Vice-President from 1881 till his decease.

During Mr. Smith's connection of thirty-two years with the Manhattan Gas Light Company, of the City of New York, the business of the manufacture and distribution of illuminating gas in this country grew from small proportions to an enormous industry, and in this growth the company with which he was connected had a large and representative part. The changes were not only in the amount of manufacture and extent of distribution, but also in important improvements in the scientific and mechanical apparatus and processes for the proper treatment of the products from the destructive distillation of coal. In all these advances Mr. Smith was the trusted adviser of this great company, as well as the engineer in immediate charge of its extensive works. Quiet, clear, studious and thoughtful, he became an eminent authority in all questions connected with this branch of engineering.

As a Director of the American Society of Civil Engineers for four successive years, his clear judgment and excellent business knowledge were of especial value, and were thoroughly appreciated by the members of the Board of Direction in their management of the trusts confided to them.

Mr. Smith was elected a Member of the American Society of Civil Engineers, July 5th, 1876, and was a member of its Board of Direction from November, 1877, to January, 1882.

ISAAC NEWTON, M. Am. Soc. C. F.

DIED SEPTEMBER 25TH, 1884.

Isaac Newton, Ph.D., was born in New York City, August 4th, 1837. He was the eldest son of the late Isaac Newton, for many years prominently known in connection with steam navigation, and the originator of the People's Line of North River steamboats.

Mr. Newton's early education was at the Columbia College Grammar School, at Hamilton College, and finally at the New York University, where he graduated in 1856. His practical education in the profession which he had adopted was of a most thorough character. Under his father's direction he was apprenticed in the Delamater Machine Shop (Phoenix Foundry) and at the Novelty Works, and subsequently on a North River steamboat he worked his way from the lowest grade to that of assistant engineer. He then acted as engineer (1857-58) on one of the Collins' Line of Steamers between New York and Liverpool, terminating with an engineering tour in Europe during the year 1859.

On the breaking out of the war he sought employment under the Government, and, after passing his examination, was commissioned as first assistant engineer U. S. Navy in June, 1861, and was ordered for duty on the U. S. steam frigate Roanoke in the blockade of Charleston Harbor. On November 29th, 1861, on the application of Mr. Ericsson he was assigned to duty in connection with the construction of the proposed ironclad to be built for the Government by Mr. Ericsson, subsequently named the Monitor, but upon which no work had as yet been done. The Monitor was launched January 30th, 1862, just one hundred days after her keel-plate was laid. Upon her completion, Mr. Newton volunteered for duty on board; was appointed her first assistant engineer; and was in charge of the engines during the historic combat which followed with the rebel ram Merrimac, March 9th, 1862, which marked a recognized era in the history of the steam navies of the world. In August of the same year he was assigned to duty in New York as superintendent of the construction of ironclads, and for three years thereafter, was engaged in the office of the General Inspector of Ironclads, in preparing plans and specifications for and the construction of an ironclad fleet for the Atlantic seaboard.

He resigned from the navy at the close of the war, and took charge of the Broad Top Coal Co.'s Works (Kemble Coal and Iron Company), as engineer. In 1868 he was engaged under General McClellan in the reconstruction of the Stevens' Steam Battery at Hoboken. In June, 1869,

Committee to prepare Memoir: Colonel Julius W. Adams, M. Am. Soc. C. E.; Mr. G. S. Greene, Jr., M. Am. Soc. C. E.; and Mr. John Bogart, M. Am. Soc. C. E.

he was appointed by the Secretary of the Navy a member of the board to examine and report the conditions and needs of the steam navy of the United States.

In 1871-72 he was assistant to General McClellan in the Department of Docks, New York, and designed and constructed the one hundred ton floating derrick, still in use on these works.

In 1872 he was employed by the government of the British Colony of Prince Edward Island, as consulting engineer, to examine and report upon needed changes in the plans and construction of the railways of that colony, some 160 miles of which were then in progress. In this same year he was tendered the position of chief engineer of one of the departments of public works under the Khedive of Egypt, which he declined. He was engaged for several years subsequently in various private enterprises: U. S. Rolling Stock Co., in the preparation of plans and specifications for locomotive engine construction; consulting engineer Burlington and Southwestern Railway, Iowa; drainage works in connection with the International Railways of Nova Scotia; consulting engineer to New York Rapid Transit Commission; Member of the United States Court of Claims in the Monitor cases; Trustee of the New York and Brooklyn Bridge; and finally, March 1881, was appointed Chief Engineer of the Department of Public Works, City of New York, by Commissioner Thompson.

When Mr. Newton became the chief engineer of the department, there existed a pressing necessity for a speedy solution of the problems connected with the increase of the water supply of the City of New York. In the study of these problems, he quickly determined that true economy and good engineering demanded that the provisions to be adopted for this purpose should be of no temporary or inadequate character, but should be such as would give an abundant supply of water to the city, with due regard to the certain growth of its population. In a very short time after taking up the subject, he presented in definite form the outlines of the project for this great engineering work. His suggestions received the approval of the eminent engineers called to consult with him. He gave to the subject, both during the elaboration of the plans and after their completion, the earnest study and devotion characteristic of the man, and the plans presented are in their general outline those upon which the new Croton Aqueduct is now in progress of construction.

His services to the city of his birth in the professional ability brought to this work, and the deep personal devotion given to it by him, will always be a part of the history of this metropolis. His close attention to and thorough absorption in these studies doubtless undermined his health and shortened a useful life.

Mr. Newton was elected a Member of the American Society of Civil Engineers, March 3, 1880.

THEOPHILUS E. SICKELS, M. Am. Soc. C. E.

DIED FEBRUARY 4TH, 1885.

Theophilus E. Sickels was a son of Dr. John Sickels, an old New York citizen, member of the Cholera Commission of that city during 1828 and 1832, and afterwards Medical Inspector of the city; an ardent politician, an original thinker, and a man of large reading and marked ability. Mr. Sickels received an academical education, and, like his father, was a classical scholar, although particularly excelling in mathematics and physical science.

He entered his profession in 1839, at the age of seventeen, as an assistant in the construction of the Croton Aqueduct, under Mr. John B. Jervis, Hon. M. Am. Soc. C. E. Subsequently he was engaged upon the Erie Railway; upon the enlargement of the Erie Canal; and upon the Bear Mountain Railway. From 1848 to 1850 he was a resident engineer upon the Boston Water-works. He was also engaged upon the construction of the United States Dry Dock at Brooklyn, and in 1852 was the chief engineer of the Philadelphia and West Chester Railroad. From 1855 to 1857, he was the chief engineer of the Philadelphia and Baltimore Central Railroad; 1857 to 1860, chief engineer and general superintendent of the Hannibal and St. Joseph Railroad. Subsequently he was engaged upon the construction of the bridge over the Harlem River at Third avenue, New York. In 1868 he became the chief engineer and general superintendent of the Union Pacific Railway, resigning that office in 1874, but retaining so greatly the confidence of the management, that he held the position of its consulting engineer at the time of his death.

In 1874 he was designated by the President, General Grant, as his personal choice, as one of the commission of seven engineers to consider and recommend to Congress the proper method for securing an open mouth to the Mississippi River. In the performance of this duty Mr. Sickels visited Europe, and joined in the report upon which the action of Congress was based, resulting in the notable improvement of the South Pass. Mr. Sickels was an earnest advocate of the jetty system.

In 1876, Mr. Sickels was one of the judges of the Centennial Exposition in Philadelphia, and in 1878 was the representative of the American Society of Civil Engineers at the Paris Exposition. He was afterwards connected as chief or consulting engineer with various enterprises in different parts of the United States, and at the time of his death was the consulting engineer of the South Pennsylvania Railroad. In an in-

spection of one of the tunnels in course of construction on that road, he inhaled the fumes from an explosion, from the effects of which he never recovered.

Mr. Sickels built the Omaha bridge of the Union Pacific Railway, one of the earliest constructions with iron tubular piers. He was at the time of his death constructing a bridge over the Arkansas at Little Rock.

Mr. Sickels' large experience in the United States was supplemented by frequent visits abroad. His wide and accurate professional knowledge, his cultivated judgment, and the great personal purity of his character, made him the adviser and trusted counselor of many of the men who have had to do with the great undertakings in public works in the United States for many years past. Although constantly connected with active and important engineering works, Mr. Sickels' manners were very modest and unpretending, and only when he became ardent in the discussion of professional topics, would one appreciate the range of his knowledge and his power of concise and luminous expression. Mr. Sickels' home was at Kennett Square, Chester County, Pennsylvania, where he had a delightful residence. He retained, however, his professional office in New York up to his decease. He was a widower, and leaves but one daughter.

Mr. Sickels was elected a member of the American Society of Civil Engineers, February 21st, 1872.

DANIEL L. WELLS, F. AM. SOC. C. E.

DIED NOVEMBER 24TH, 1884.

Daniel L. Wells was born in Middlebury, Vt., July 21st, 1821. He spent his boyhood days at Middlebury. About 1849 he was engaged in office work and as accountant by T. F. Strong, of Fond du Lac. Mr. Strong was the contractor for building the eastern division of the Rutland and Burlington Railroad of Vermont, when Mr. Wells went to work for him, and it was in his office that the latter commenced his life work in connection with railroad construction. In 1851-52 Mr. Wells managed the books and accounts and disbursed the funds of Eastman, Page & Co., who built the Rutland and Washington Railroad in Vermont and New York. He next went to Canada, where he became interested as junior partner in building quite an important section of a new railroad. Thence he went to Cincinnati, O., where he did work on the Ohio and Mississippi Railroad. In 1856 he became associated as junior partner with Selah Chamberlain in constructing the line of the old La Crosse and Milwaukee Railroad from Minnesota Junction to La Crosse. This job was pushed to completion with great energy. In 1859 the firm of Wells & French constructed the Chicago and Northwestern Railway from Janesville to Fort Howard. The spirit and energy displayed by the firm in this undertaking placed it so prominently before the railroad interests in the Northwest, at a time when the work of building the numerous lines of railroad which now intersect the country was being fairly commenced, that it was steadily engaged in railroad construction in the States of Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas and Michigan until the death of Mr. French in 1880. Since then Messrs. Wells, Harrison & Shute, and—succeeding the death of Mr. Shute—Messrs. Wells, Harrison & Greene have continued an active and honorable career as railroad contractors and builders. About the year 1862, Mr. Wells became the junior partner of the firm of Chapin & Wells, bridge and car-builders, Chicago. Within two years thereafter, Mr. Chapin disposed of his interest to Wells & French, who in turn were succeeded by the Wells and French Manufacturing Company, which became, and still is, one of the most prominent and largest bridge and car-building concerns in the West.

Mr. Wells was a resident of Milwaukee, Wis., and for many years was one of its most active citizens, interested in and connected with the great development of that prosperous city.

Years of attention to heavy business demands finally told upon an exceptionally strong constitution, which was constantly inured to work by a life of simple and unostentatious habits, and for five years last past, organic disease of the heart was fully developed. Thenceforward Mr. Wells dismissed all details of business, and maintained an equanimity of mind remarkable when linked with such a keen relish for business as Mr. Wells possessed. He continued, however, to cheerfully give advice and render judgment in regard to his varied and weighty interests, his counsel being continually sought by his associates. He would not allow such demands upon him, however perplexing they might be, to annoy him. Under the influence of a strong will, bent in this direction, his character broadened and revealed the true man. Favored with a generous competence of worldly goods, he learned the blessedness of giving, and in later years his charities, though unostentatious, were numerous and bountiful. His business life has been unimpeachable. No promise he made was ever allowed to go unfulfilled. His social life was equally bright, as the many friends of himself and family fully attest. He was a man of deep religious convictions, and was very constant, honest and unobtrusive in the discharge of those duties which fall upon a God-fearing man.

In 1852, at Granville, Washington County, N. Y., he married Miss Helena M. Lee. His widow and two daughters, Alice M. and Katharine Lee Wells, survive him.

Mr. Wells became a Fellow of the American Society of Civil Engineers, June 13th, 1883.

ADDITIONS TO LIBRARY AND MUSEUM.

- From Argentine Scientific Society.
Ponciano Lopez, Secretary, Buenos Ayres:
- Annales, Vol. XVIII, No. 5.
Memoria sobre Ferro-Carriles Nacionales y estado de valous al 30 de Junio de 1883. Tomo 1 and 2.
Annuaire Statistique de la Province de Buenos Ayres.
Memoria del Ferro-Carril Andino por el ano de 1883.
Nueva Expedicion a las Tierras y Mares Australes bajo el Mando de Capitan Bove El Territorio de las Misiones por Ramon Lista.
Informes Preliminares presentados A. S. S. E. E. los Ministros del interior y de guerra y Marina de la Republica Argentina por Giacomo Bove jefe de la Comision Cientifica de la expedicion y publicados bajo la direccion del Instituto Geografico Argentino precedidos de una introduccion y de otros documentos relativos a la expedicion Austral Argentina.
- From American Institute of Mining Engineers, Dr. R. W. Raymond, Secretary, New York:
- The Siemens Patents for Improvements in Furnaces, with Suggestions for their use with Natural Gas. B. Silliman.
Note on an Occurrence of Nickel and Cobalt in Nevada. A. D. Hodges, Jr.
Tin Ore Veins in the Black Hills of Dakota. William P. Blake.
The Cost of Mining and Milling Gold Ores in Nova Scotia. Willard Ide Pierce.
A New System of Ore Sampling. D. W. Brunton.
The Patience of Copper and Silver as Affected by Annealing. Henry M. Howe.
A Combined Vacuum Pump and Table-Blowpipe. W. F. Durfee.
The Estimation of Phosphorus in Iron and Steel (Supplementary Note). Byron W. Cheever.
Experiments with a Straight or No Bosh Blast Furnace. W. J. Taylor.
The Iron Mines of Putnam County, N. Y. Arthur F. Wendt.
Notes on Coal Dust in Colliery Explosions. E. S. Hutchinson.
Quicksilver Reduction at New Almaden. Samuel B. Christy.
Geology and Mineral Resources of the Rio Grande Region in Texas and Coahuila. E. J. Schmitz.
The Electrical Activity of Ore Bodies. Carl Barns, Ph. D.
The Improved Langen Charger. Frank Firmstone.
The Iron Ore Range of the Santiago District of Cuba. James P. Kimball.
Note on a Fire Bulkhead. Chas. M. Rolker.
Notes on the Treatment of Nickel-Cobalt Matres at Mine La Motte. James W. Neill, E. M.
The Deep River Coal Field of North Carolina. Dr. H. M. Chance.
- Hadfield's Patent Manganese Steel. Joseph D. Weeks.
A New Rock Drill without Cushions. A. C. Rand.
American Mining Machinery in Mexico and Central America.
Progress of the Manufacture of Soda by the Ammonia-Soda Process. Oswald J. Heinrich.
From Horatio Allen, South Orange, N. J.:
The Railroad Era. First five years of its development. Horatio Allen. (*Copies for distribution.*)
From *The American Engineer*, Chicago, Ill.:
Steam Making or Boiler Practice, Prof. Charles A. Smith.
From Hon. W. H. Armstrong, Commissioner of Railroads, Washington, D. C.:
Annual Report of the Commissioner of Railroads made to the Secretary of the Interior for the year ending June 30, 1884.
From Chas. A. Ashburner, Philadelphia, Pa.:
Brief Description of the Anthracite Coal-fields of Pennsylvania. Charles A. Ashburner.
Sketch of the Geology of Carbon County, Pennsylvania. Charles A. Ashburner.
From Association of Engineering Societies, H. G. Prout, Secretary, New York:
Transactions, Vol. IV, No. 3, January, 1885.
From John W. Bacon, Danbury, Conn.:
Thirty-second Annual Report of the Railroad Commissioners of the State of Connecticut for the year 1884.
From Lieut. T. N. Bailey, Charleston, S. C.:
Letter of Gen. Q. A. Gillmore, U. S. Engineer, U. S. A., on the Jetties in Charleston Harbor.
From Gen. S. V. Benét, Chief of Ordnance, U. S. A., Washington, D. C.:
Annual Report of the Chief of Ordnance for 1884.
From Board of Commissioners Second Geological Survey of Pennsylvania, Harrisburg, Penn.:
Annual Report of the Board, January 1, 1885.
From the Board of Harbor and Land Commissioners, Boston, Mass.:
Annual Report of the Harbor and Land Commissioners for the year 1884.
From Board of Railroad Commissioners, Wm. A. Craft, Clerk, Boston, Mass.:
Sixteenth Annual Report of the Board of Railroad Commissioners, January, 1885.
From James P. Bogart, New Haven Conn.:
Fourth Report of the Shell-fish Commis-

sioners of the State of Connecticut to the General Assembly, January, 1885.

From John Bogart, Secy. Am. Soc. C. E., New York:

Annual Report of the Ottawa Water-works Committee for the year ending 31st October, 1884, with Official Reports.

From A. J. Bowie, San Francisco, Cal.:
The Destruction of the English Dam.
Transactions of the Technical Society of the Pacific Coast for June, 1884.

From Fred. W. Brearey, London, England:
Pamphlet on the relation of the Aeronautical Society of Great Britain with respect to Aeronautics.

From Fred. Brooks, Boston, Mass.:
Two Photographs of the Mexican Central Railway Viaduct near town of Encarnacion, Jalisco, erected 1884.

Mexican Central Railway, passing obliquely under aqueduct.

From Bureau of Education, Washington, D. C.:

Circulars of Information of the Bureau of Education, Nos. 6 and 7, 1884.
Buildings for the Children in the South.

From James A. Burden, Troy, New York:
Copies answering Affidavits, Supreme Court, Rensselaer County. Isiah Townsend Burden against James N. Burden, John L. Arts, William Irvin, Richard Irving and the Burden Iron Company.

From Chief Signal Office, U. S. Army, Washington, D. C.:
Annual Report of the Chief Signal Officer to the Secretary of War for the year 1883.

From Major H. W. Clarke, Syracuse, N. Y.:
Proceedings of the Board of City Auditors of the City of Syracuse for the Fiscal Year 1884.

From Gen. C. B. Comstock, Corps of Engineers, U. S. A., New York:
Map of Survey and Report upon the Work of Deepening Gedney's Channel through Sandy Hook Bar, New York; also indorsing a Report from the Board of Fortifications upon a plan for the permanent improvement of the entrance to New York Harbor.

From E. L. Corthell, New York:
The Tehuantepec Ship Railway: its Practicability and Commercial Features. (From *The Mexican Financier*, December, 1884.)

From J. James R. Croes, New York:
Pamphlet of the Suburban Rapid Transit Company, containing Contract for Construction of Elevated Iron Structure north of the Harlem River, designed by Theodore Cooper, Consulting Engineer.

From E. B. Dorsey, London, England:
Catalogues of the American Exhibition, London, 1886.

Laxton's Price Book for Architects, Builders, Engineers and Contractors, 1885.

From Capt. James B. Eads, New York:
Steel Engravings of the Interoceanic Ship Railway, as follows:

(1.) Sectional elevation of Pontoon and Railway Cradle.

(2.) The Lifting Pontoon and Railway Cradle.

(3.) Illustrations of the Turn-table.

(4.) The Floating Turn-table.

(5.) A Steamer in Transit.

From M. Eissler, New York:
Ten Photographs on the Isthmus of Panama.

From Messrs. Eppinger and Russell, New York:
New York: its Leading Merchants and Manufacturers.

From Walton W. Evans, New York:
A Letter to the Chief of the Bureau of Statistics of the United States.

Chapters on Locomotives and Iron Bridges, from a Letter to the Chief of the Bureau of Statistics of the United States.

From John T. Fanning, Manchester, N. H.:
Report No. 2 on a Water Supply for New York and other Cities of the Hudson Valley.

From Sandford Fleming, Ottawa, Canada:
Descriptive Sketch of the Physical Geography and Geology of the Dominion of Canada; also Two Maps of the Dominion of Canada, Geologically Colored, from Surveys made by the Geological Corps, 1842 to 1882.

From Franklin Institute, Philadelphia, Pa.:
Report of Examiners of Section XVIII. Underground Conduits. International Electrical Exhibition, 1884.

Subject Catalogue of the Memorial Library of the International Electrical Exhibition held under the auspices of the Franklin Institute, September and October, 1884.

From Capt. F. V. Greene, Corps of Engineers, U. S. A., Washington, D. C.:

Annual Report of the Operations of the Engineers' Department of the District of Columbia for the year ending June 30, 1884.

From Henry G. Hawks, State Mineralogist of California:
Fourth Annual Report of the State Mineralogist of California for the year ending May 5, 1884.

From Prof. Dr. Hauck, Berlin, Prussia:
Festschrift der Königlichen Technischen Hochschule zu Berlin Zur Feier der Einweihung ihres Neuen Gebäudes, Nov. 2, 1884.

From Maj. D. P. Heap, Corps of Engineers, U. S. A., Washington, D. C.:
Annual Report of the Light-house Board to the Secretary of the Treasury for the fiscal year ended June 30, 1884.

From Clemens Herschel, Holyoke, Mass.:
On the River and Harbor Bills of the United States Congress.

From N. H. Hutton, Engineer Harbor Board, Baltimore, Md.:
The Annual Report of the Harbor Board to the Mayor and City Council of Baltimore for the fiscal year ending December 31st, 1884.

From F. R. Hutton, Secretary of the American Society of Mechanical Engineers, New York:

List of Officers, Members, and Rules of the American Society of Mechanical Engineers, January 1st, 1885.

From Wm. A. Ingham, Secretary Board of Commissioners Second Geological Survey of Pennsylvania :
Grand Atlas. Div. I. Pt. 1.
Report on the Coal Mines of the Monongahela River Region.

From Institution of Civil Engineers, James Forrest, Secretary, London :
Abstracts of Papers in Foreign Transactions and Periodicals.

The Results of some Independent Engine Tests. John George Mair.
The Steam Engine. Edward Alfred Cowper.
Minutes of Proceedings. Name Index, Vols. I to LVIII, Sessions 1837 to 1878-79.

From Iron and Steel Institute, J. S. Jeans, Secretary, London :
The Journal of the Iron and Steel Institute, No. 2, 1884.

From William P. Judson, C. E., Oswego, N. Y. :
The Water Supply of Burlington, Vermont, for the year 1884.

From Messrs. Kanters Sons, Buffalo, N. Y. :
Hydraulic Engineering after the Holland Method, for the Construction of Harbors, Breakwaters, Jetties, Shore Protection, Dams, Cribbs, Levees, etc., etc.

From J. Francis Le Baron, Jacksonville, Fla. :
Webb's Historical, Industrial and Biographical Florida. Part I. Illustrated.

From Louis Lesage, Montreal, Canada :
Annual Reports of Montreal, Canada, for the civic year 1883.

From Liverpool Engineering Society, Thos. L. Miller, Secretary, England :
Transactions. Volumes I to V inclusive, 1881 to 1885.

From Messrs. Luckhardt & Alten, Cassel, Germany :
An Account of Hohmann Coradi's Precision Planimeters, with Directions for Use. G. Coradi. Zurich.

From H. C. Mais, Adelaide, South Australia :
A Photograph of Isometrical Projection of Great Western Railway Locomotive "Iron Duke."

From T. C. Martin, Acting Secretary American Institute of Electrical Engineers, New York :
Transactions. Vol. I. May to October, 1884.

From Niles Meriwether, Memphis, Tenn. :
Biennial Report of the President of Fire and Police Commissioners of the Taxing District of Shelby County, Tenn. December 1, 1884.

From Mining Institute of Scotland. James Barrowman, Secretary, Hamilton :
Transactions. Vol. VI, Part 8.

From Military Service Institution of the United States, Governor's Island, N. Y. :
Proceedings. Vols. V and VI, Nos. 20 and 21.

From Robert Moore, St. Louis, Mo. :
The Sanitary Condition of St. Louis, with

Special Reference to Asiatic Cholera. Robert Moore, C. E.

From Gen. John Newton, Chief of Engineers, U. S. A., Washington, D. C. :
Papers with reference to the Channel at the South Pass of the Mississippi River.

Reports, maps and papers relating to the construction of a Harbor of Refuge at Sandy Bay, Massachusetts.

Report of the Chief of Engineers in Relation to the Results of a Survey of Agate and Burlington Bays, Minnesota.

Reports from the Chief of Engineers of a Survey and Preliminary Examination of Lawrenceburg Harbor, Indiana.

Reports from the Chief of Engineers of a Survey and Preliminary Examination of Gloucester Harbor, Massachusetts.

Report from the Chief of Engineers of a Preliminary Examination of Louis River, Washington Territory.

Report from the Chief of Engineers of a Preliminary Examination of Willapa River, Washington Territory.

Report from the Chief of Engineers of a Preliminary Examination of Puyallup River, Washington Territory.

Report from the Chief of Engineers of an Examination of Cœur d'Alene Lake and River, and of St. Joseph's River, Idaho.

Report from the Chief of Engineers of a Survey of Powow River, Massachusetts.

Report from the Chief of Engineers of a Survey of the Mississippi River near Guttenberg, Iowa.

Report from the Chief of Engineers of a Survey of Pawcatuck River, Rhode Island.

Report from the Chief of Engineers of a Survey of Pocumoke River, Maryland.

Report from the Chief of Engineers of an Examination of Skimpton Creek, Maryland.

Report from the Chief of Engineers of a Survey of Huntington Harbor, Long Island Sound, New York.

Reports from the Chief of Engineers of a Survey and Examination of St. Louis River and Bay, Wisconsin and Minnesota.

Reports from the Chief of Engineers of Survey and Examination of Fort Point Channel, Boston Harbor, Massachusetts.

Advertisements, instructions for bidders and specifications, as follows:

Proposals for the Iron-work in the Foundation of Dam No. 6 of the Great Kanawha River Improvement

Constructing Wharves in the Harbor of Refuge at Wood's Holl, Massachusetts.

Improving Harbor at Dunkirk, N. Y.

Improving Harbor at Sabine Pass, Texas.

Ice Piers at Point Pleasant, W. Va.

For Finishing Lock No. 2, Great Kanawha River, W. Va.

Improving Mouth of the Columbia River, Oregon and W. T.

For Deepening Geduey's Channel across the Bar at the entrance to New York Harbor.

For Furnishing Material and Building Five Square Decked Barges.

Improvement of Tampa Bay, Florida.

Improvement of Apalachicola Bay, Florida.

Improving Edenton Bay, N. C.

For Repairs needed to United States Tow Boat No. 5, Steamer Coal Bluff.

Improvement of Harbor at Charleston, S. C.

Improving St. Jones' River, Delaware.

Improvement of Rappahannock River, Va.

- Letter of Chief of Engineers, inclosing copy of Report of Col. A. F. Rockwell, U. S. A., in Relation to a System of Telegraph and Telephone Service in Westinghouse.
- Report of the "Armament Board" upon the various kinds of Ordnance for the Service.
- Report from the Chief of Engineers of a Preliminary Survey and Examinations of Red River above Fulton, of Little Red River, and of Petit Jean River, Arkansas.
- Report of Major Benyaurd, Corps of Engineers, Relative to Changes in the Shore Line of the Harbor of Calumet, Ill.
- Letter from Hon. William W. Corcoran, transmitting the Annual Report of the Washington Monument Commission.
- Report of the Chief of Engineers Relative to the Use of the Appropriation for the Improvement of Hell Gate, New York Harbor.
- Report of the Chief of Engineers in Regard to the Condition of the Falls of St. Anthony.
- Report of the Engineers Concerning the Portage Lake and Lake Superior Ship Canal.
- Report on "A Bill to Provide for the Improvement of the Channel between Galveston Harbor and the Gulf of Mexico."
- Annual Report upon Building Monument at Yorktown, Va., for the year 1884, by Wm. P. Craighill, Lieutenant-Colonel of Engineers, U. S. A.
- Report regarding the damage done the United States Breakwater in Oswego Harbor by the recent gale.
- Annual Report of the Mississippi River Commission.
- Report of the Chief of Engineers, with accompanying papers and reports from officers in charge of River and Harbor Districts.
- Report of the Chief of Engineers regarding the work done upon the Buckhannon River, West Virginia.
- The Annual Report of the Missouri River Commission.
- Report of Board of Engineers in regard to examinations at Pittsburgh, Pa., of models, plans, etc., for Movable Dams and other River Improvements at Pittsburgh, Pa.
- Report of Engineers, showing the necessity for the Enlargement of the Basin at Block Island, Rhode Island.
- Report from Lieut.-Col. H. M. Roberts, Corps of Engineers, of results of survey of the Mouth of the Saranac River, Plattsburgh, N. Y.
- Report of Board of Engineers of a preliminary survey for a Harbor of Refuge at Ludington, Mich.
- Report of the Chief of Engineers on preliminary examination of Little Harbor at Portsmouth, N. H.
- Report of the Chief of Engineers of preliminary examination of Whipple Creek in Quincy Bay, Illinois.
- Report of the Chief of Engineers on Surveys of Lac la Belle Harbor, Michigan, and Ashland Harbor, Wisconsin.
- Report of the Chief of Engineers in relation to the results of a survey of the Harbor at Hyannis, Mass.
- Report of the Chief of Engineers in relation to the results of a preliminary examination of Pasquotank River, North Carolina.
- Report of the Chief of Engineers in relation to a preliminary examination of the outlets of Beaufort River, Louisiana.
- Report of the Chief of Engineers concerning the inefficiency of the lockage of the Sault Saint Mary Canal.
- Report from the Chief of Engineers in relation to the results of a survey from Chincoteague Bay, in Virginia, to Delaware Bay, at or near Lewes, Del.
- Official Army Register for January, 1885.
- Report of the Gun Foundry Board, with supplement, for 1884.
- Report of preliminary examination of Natalbany River, Louisiana, with estimate of cost of the improvement.
- Report from Capt. Erie Bergland, Corps of Engineers, of a preliminary examination of Deer Creek, Mississippi.
- Report from the Chief of Engineers of a survey of Warren River, Rhode Island, made with a view to removal of obstructions from its Channel.
- A report from the Chief of Engineers of a survey and preliminary examination of Salmon River at and below Fort Covington, N. Y.
- Reports from the Chief of Engineers of a survey and preliminary examination of Hingham Harbor, Massachusetts.
- A report from the Chief of Engineers, with accompanying papers, relative to the improvement of Harbor at Cleveland, Ohio.
- Reports from the Chief of Engineers of a survey and preliminary examination of Whitehall Harbor, New York.
- Reports from the Chief of Engineers of a survey and preliminary examination of Mobile River and Harbor.
- From Hon. Joseph Nimmo, Jr., Chief of Bureau of Statistics, Washington, D. C.:
- Railroad Federations and the relation of the Railroads to Commerce.
- Report of the Chief of the Bureau of Statistics in regard to the Foreign Commerce of the United States for the year 1884.
- From Charles Paine, Cleveland, Ohio:
- Annual Report of the Commissioner of Railroads and Telegraphs of Ohio for the year ending June 30th, 1880-81.
- From E. Pontzen, Paris, France:
- Die Grosse Siebenburger Drahtseilbahn.
- Étude pour les nouvelles Installations Maritimes et l'Achèvement des Digue de la Seine. H. Hercent.
- Colonne Soleil project de Phanelectrique pour la Ville de Paris.
- From Charles Ward Raymond, Brooklyn, N. Y.:
- The Electrician and Electrical Engineer, containing article on the "Ball Unipolar Inductor Dynamo." Chas. Ward Raymond, Jun. Am. Soc. C. E.
- From the Riga Technical Society, Riga, Russia:
- Rigasche Industrie Zeitung for 1876 to 1883, inclusive.
- From Frederic H. Robinson, Wilmington, Del.:
- Fourteenth Annual Report of the Chief Engineer of the City of Wilmington, Delaware, for the year 1884.
- From John A. Russell, Clerk Board of Supervisors, San Francisco, Cal.:
- San Francisco Municipal Reports for the fiscal year 1883-84.

From Hon. H. Sabine, Commissioner of Railroads, Columbus, Ohio:
Annual Report of the Commissioner of Railroads and Telegraphs of Ohio for the year ending June 30, 1882-83.

From Collingwood Schreiber, Ottawa, Canada:
Diagram illustrating progress made with the Works of Construction of the Canadian Pacific Railway up to 31st of January, 1885.

Annual Report of the Minister of Railways and Canals of the Dominion of Canada for the past fiscal year, from 1st July, 1883, to 30th of June, 1884.

From Capt. Clinton B. Sears, Corps of Engineers, U. S. A., Memphis, Tenn.:
23 Photographs illustrating the Improvement of the Mississippi River at Lake Providence Reach, as follows:
Headquarter Boat, containing officers' mess, bed and store-rooms, etc. Repair-shops on right.

Intersection of Inner Main Dike with Cross Dike No. 6. Duncansby system.

Repair Shops. (Second View.) The Mattress-boat is in the center, and end dock in left center of foreground.

Main Dike and Cross Dike No. 3. Cottonwood system (Low-water state). Foot-mat with stone ballast and wattling. Foot-mat was sunk during high water.

Intersection of Main and Cross Dike, No. 2. Cottonwood system. Cross dike has wattling and foot-mat.

Barges loaded with brush for mattress work. Engineer's office at Pilcher's Point, La.

Break in Cross Dike, No. 1. Cottonwood system. On right center is the foot-mat ready to sink.

Headquarters of the Survey Party.

Cross Dike, No. 1. Baleshead system.

Upper Bank Revetment. Head of Mayersville Island.

Hydraulic Grader at work.

Hydraulic Grader. Mattress boat.

Cross Dikes, No. 2. Cottonwood system.

Upper Bank Revetment. Mayersville Island.

U. S. Survey Steamer Meter.

Repair Shops. (First View.)

Weaving a brush mattress for lower bank.

Revetment. Mattress boat at head with brush barges in rear. Head of Mattress in down stream.

U. S. Steamer Emma Etheridge on the U. S. Floating Dry Dock. Quarters boat on the left.

Constructing Foot-mat at Low Water for a High Water Dike. Cottonwood system. Screen boat in near center; brush barge in left rear.

Repairing Break in Dike Across Mayersville Chute. (Looking S. W.) Drift accumulation shown in center and left. Quarters boat in left rear.

Repairing Break in Dike Across Mayersville Chute. (Looking E.) Drift accumulation shown beyond pile-driver in left center.

Brush Mattress for Lower Bank Revetment Ready to be Ballasted and Sunk. Mooring barge in center. Quarters boat and tow-boat in right center.

From Seismological Society of Japan, Prof. John Milne, Foreign Secretary, Tokio, Japan:
Transactions. Vol. VII, Part II. 1884.

From T. Guilford Smith, Buffalo, N. Y.:

Report of the President and Managers of the Philadelphia and Reading Railroad Company to the Stockholders for the Year ending November 30th, 1884.

From Prof. Cady Staley, Schenectady, N. Y.:
Union College Circular and Catalogue for 1884-85.

From George F. Swain, Boston, Mass.:
Twentieth Annual Catalogue of the Officers and Students of the Massachusetts Institute of Technology, with a Statement of the Courses of Instruction for the Year 1884-85.

From George L. Vose, Boston, Mass.:
Notes Relating to the Early History of Transportation in Massachusetts.

From United States Naval Observatory, Washington, D. C.:

Report of the Superintendent of the United States Naval Observatory for the Year ending October 30th, 1884.

From United States Signal Service, Washington, D. C.:

Researches on Solar Heat and its Absorption by the Earth's Atmosphere.

From Prof. John A. Waddell, University of Tokio, Tokio, Japan:

Appendix to the Memoir No. 5 of Tōkiō Daigaku Tōkiō University.

Measurement of the Force of Gravity at Noha (Okinawa) and Kagoshima. By R. Sakoi and E. Yamaguchi.

From George E. Waring, Newport, R. I.:

Sewage and Sewage Disposal at Providence, R. I.

From Edmund B. Weston, C. E., Providence, R. I.:

Bulletin of the New England Meteorological Society.

From Messrs. Welton and Bonnett, Waterbury, Conn.:

Eighteenth Report of the Board of Water Commissioners of the City of Waterbury, Conn., for the Year ending December 31st, 1884.

From other sources:
Annual Report of the Board of Managers of the New York State Reformatory at Elmira for the Year ending September 30th, 1884.
A Description of the Means by which Freight of certain kinds and sufficient quantity may be carried overland for sixty cents per ton per thousand miles.

LIST OF MEMBERS.

ADDITIONS.

MEMBER.

Date of Election

GOULD, EDWARD SHERMAN.....Division Engineer New Croton
Aqueduct, Yonkers, N. Y.....Nov. 4, 1885.

JUNIORS.

BOOKER, BERNARD FRANKResident Engineer, Northern
Division Chicago, Burlington
and Northern R. R. (Box 155),
Prescott, Wis.....Oct. 7, 1885.
BRERETON, THOMAS JOHN.....Maintenance of Way Department
Pennsylvania R. R., Altoona,
Pa....." " "
CARRÈRE, JOSEPH MAXWELL121 East Thirty-fifth st., New
York City....." " "
MATLACK, CHARLES P.....City Engineer, San Antonio,
Texas....." " "
SANFORD, DAVID COLEY.....First Assistant Engineer Con-
necticut Shell Fishery Com-
mission (Box 716), New Haven,
Conn.....May 6, 1885.

CHANGES AND CORRECTIONS.

MEMBERS.

BRUNER, DANIEL P.....Germantown, Pa.
BURNS, EDWARD C.....Cor. East 4th and Spring sts., Jamestown, N. Y.
CUNNINGHAM, JAMES H.....1 Victoria Mansions, Victoria st., London,
S. W., England.
GELETTE, WILLIAM D.....Manager Pomona Land and Water Co., Po-
mona, Los Angeles Co., Cal.
HILGARD, JULIUS E.....1739 F st., Washington, D. C.
HUNT, CHARLES W.....New Rochelle. N. Y.
MARINDIN, HENRY L.....Assistant U. S. Coast and Geodetic Survey,
Washington, D. C.
MOULTON, MACE.....Chief Assistant Engineer Kentucky and In-
diana Bridge, Louisville, Ky.

- PAINE, CHARLES.....Vice-President New York, Lake Erie and
Western R. R., 21 Cortlandt st., New York
City.
- SMITH, HAMILTON, JR.....(Care Salisbury Club), St. James' square,
S. W., London, England.
- SMITH, W. HARRISON.....Treasurer and General Manager Centre Mining
Co., Pennsylvania Furnace, Huntingdon,
Co., Pa.

JUNIORS.

- FRANCIS, GEORGE B.....204 West 128th st., New York City.
- FULLER, WILLIAM B.....Assistant Engineer Northern Pacific R. R.,
417 East 10th st., St. Paul, Minn.
- PARSONS, W. BARCLAY, JR.....35 Broadway, Room 73, New York City.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XI.—December, 1885.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

NOVEMBER 18TH, 1885.—The Society met at 8 p. m., Vice-President G. S. Greene, Jr., in the Chair. Discussions were presented on Wind Strains in Bridges; on Formulas for the Weight of Iron and Steel Railway Bridges; and on Canals and Railways, Ship Canals and Ship Railways.

DECEMBER 2D, 1885.—The Society met at 8 p. m., President Fred. Graff in the Chair.

The following candidates were elected as Members: Harry Hubbard Latham, of Chicago, Illinois; Frank McDowell Leavitt, of Brooklyn, N. Y.; Arthur Macy, elected Junior, January 12th, 1877, of Silver King, Arizona; Arthur Pou, of Talbotton, Ga.

A communication from the Trustees of the Elizabeth Thompson Science Fund was presented, giving information of the establishment of this fund, and of the desire of the Trustees to receive applications for appropriations in aid of scientific work.

Presentation to the Society was announced of a handsome 24-hour clock, the figures upon the dial of which automatically exhibit the proper hour numbers in succession without interfering with the regularity of the time-piece.

The presentation to the Society by Gen. G. S. Greene, Past-President Am. Soc. C. E., of a rare lithograph-portrait of the late George W. Whistler, C. E., was announced. The thanks of the Society were tendered for this, and, on motion, the subject of procuring for the Society suitable portraits of eminent engineers was referred to the

Board of Direction, with a recommendation for its favorable consideration.

It was announced that the Annual Meeting would occur on January 20th; that the Board of Direction would appoint a Committee of Arrangements; and that Members of the Society were requested to make suggestions on the subject to the Board through the Secretary.

The President announced the appointment of the following Committee to consider the Compressive Strength of Cements, and the Compression of Cement and Settlement of Masonry, stating that additional Members of the Committee would be announced at a future time: Messrs. F. Collingwood, D. J. Whittemore, W. W. Maclay, T. C. McCollom, T. L. Casey, George F. Swain and A. V. Abbott.

A discussion upon the subject of Wind Strains in Bridges was read by W. Howard White, M. Am. Soc. C. E.

Discussions upon Formulas for the Weight of Bridges were presented from A. J. DuBois, Jun. Am. Soc. C. E., Wm. H. Burr, Assoc. Am. Soc. C. E., J. S. Elliot, C. E., and Geo. H. Pegram, M. Am. Soc. C. E.

Discussions by A. G. Menocal, M. Am. Soc. C. E., and E. L. Corthell, M. Am. Soc. C. E., were read upon a paper previously read by Mr. Corthell on Canals and Railways, Ship Canals and Ship Railways.

DECEMBER 16TH, 1885.—The Society met at 8 P. M., Vice-President G. S. Greene, Jr., in the Chair. A paper by Capt. F. V. Greene, M. Am. Soc. C. E., on Street Traffic was read, and discussed by Messrs. Wellington, North, T. C. Clarke, J. D. Estabrook, Cooper, Robert L. Harris and F. V. Greene.

OF THE BOARD OF DIRECTION.

NOVEMBER 12TH, 1885.—Applications were considered. Action was taken as to arrears of dues. Appropriations were made.

NOVEMBER 25TH, 1885.—Applications were considered. A form of circular was adopted for issue to Members in relation to increasing the Junior Membership of the Society, in accordance with the action of the meeting of November 4th.

DECEMBER 2D, 1885.—Applications were considered.

DECEMBER 22D, 1885.—Applications were considered. A final communication from the Nominating Committee was presented, and it was directed that the list submitted by the Nominating Committee be posted, and the ballot issued. Arrangements were made for the Annual Meeting.

DECEMBER 30TH, 1885.—Applications were considered. The preparation of the Annual Reports was directed. Action was taken as to Members in arrears for dues.

ADDITIONS TO LIBRARY AND MUSEUM.

- From Aeronautical Society of Great Britain, London:
Annual Reports of the Society for the years 1883-84.
- From Charles A. Allen, Worcester, Mass.:
City Documents, No. 38 and No. 39, City of Worcester, Mass.:
- From American Academy Arts and Sciences, Boston:
Proceedings, May, 1884, to May, 1885. New Series. Vol. XII.
- From American Institute of Architects, Geo. C. Mason, Secretary, Newport, R. I.:
Proceedings of the Eighteenth Annual Convention, held in Albany, N. Y., October 22d and 23d, 1884.
- From American Wood Preserving Company, Boston:
The American Wood Preserving Company's Process, Copper and Barium, as practiced at the Works erected by the Company for the United States, at the United States Navy Yard, Boston, Mass. 2 copies.
- From American Institute of Mining Engineers. Dr. R. W. Raymond, Secretary, New York City:
Proceedings of the Forty-second Meeting, Chattanooga, May, 1885.
The Iron Ores of Picton County, Nova Scotia. E. Gilpin, Jr.
The Influence of Temperature in Steel-making on the Behavior of the Ingots in Rolling. John W. Cabot.
Biographical Notice of Sidney Gilchrist Thomas. George W. Maynard.
The Utilization of the Iron and Copper Sulphides of Virginia, North Carolina and Tennessee. C. R. Boyd.
A Simple Apparatus for Determining the Relative Strength of Explosives. S. Whinery.
Proceedings of the Fortieth (Annual) Meeting. New York, February, 1885.
The Relative Value of Coals to the Consumer. Dr. H. M. Chance.
Discussion of Dr. Chance's Paper on the Relative Value of Coals to the Consumer. Dr. J. P. Kimball.
The Use of High Explosives in the Blast Furnace, and of a Water-spray for Cooling in Blowing-Down. W. J. Taylor.
The Clapp and Griffiths Process. J. P. Withers.
Removing Obstructions from Blast-Furnace, Hearths and Boshes. T. F. Witherbee.
The La Plata Mountains, Colorado. Henry C. Freeman.
Combined Amalgamation and Concentration of Silver Ores. W. McDermott.
Hematite of Franklin County, Vt. Alfred F. Brainerd.
- The Clapp and Griffiths Process. Robert W. Hunt.
Further Notes on the Clapp and Griffiths Process. Robert W. Hunt.
Discussion of the Paper of R. W. Hunt, on the Clapp and Griffiths Process.
A Water-Gas Open Hearth Furnace. N. Lilenbey.
A Bessemer Converting House without a Casting Pit. L. G. Laureau.
A New Regenerative Hot-Blast Oven. John C. Long.
Fuel Economy in Engines and Boilers. P. Barnes.
Certain Interesting Crystalline Alloys. Richard Pearce.
The Fabnehjelm Water-Gas Incandescent Light. R. W. Raymond.
The Source and Behavior of Fire-Gas in the Johnstown Mines. John Fulton.
The New Mining Code of Mexico. Richard E. Chism.
The Straight or No-Bosh Blast Furnace. W. J. Taylor.
Biographical Notice of Benjamin Silliman. Dr. T. Sterry Hunt.
Colored Mining Labor. Alfred T. Brainerd.
The Microscopic Structure of Iron and Steel. F. Lynwood Garrison.
Treatment of Roasted Pyrites by the Long Maid and Claudet Processes for the Extraction of Gold and Silver. T. Egleston.
Quicksilver Condensation at New Almadero. Samuel B. Christy.
The Durham Blast Furnace. B. F. Faekenthal.
Lixivation and Amalgamation Tests. T. H. Clark.
Experiments with Bolts and Screw-Threads. Maj. King, U. S. Engineers.
The Amalgamation of Gold Ores, and the Loss of Gold in Chloridizing-Roasting. C. A. Stetefeldt.
The Homogeneity of Open-Hearth Steel. H. H. Campbell.
Note on a Self-Dumping Water Tank. Willard Ide Pierce.
Mr. E. D. Campbell's Calorimetric Process for Estimating Phosphorus in Iron and Steel. Byron W. Cheever.
Estimation of Manganese, Carbon and Phosphorus in Iron and Steel. Byron W. Cheever.
Improvements in Ore-Crushing Machinery. S. R. Krom.
The Sulphide Deposit of South Iron Hill, Leadville, Colorado. Francis T. Freeland.
The "Centennial" and "Lotta" Gold Properties, Couchulla, Mexico. Dr. Persifor Frazier.
The Manufacture of Steel Castings. P. G. Salom.
The Geology and Mineral Resources of Sequachee Valley, Tennessee. W. M. Bowron.

The Manufacture of Iron in Canada. James Herbert Bartlett.

From American Train-Dispatchers' Association, Isaac H. McEwen, Secretary, Buffalo, N. Y.:

Proceedings of Second Annual Convention, held at Denver, Colorado, June 16, 17, and 18, 1885. Also Constitution and By-Laws, list of Officers and Members, and Executive Committee Session.

From the Association of Engineering Societies, H. G. Prout, Secretary, New York City:
Transactions, Vol. IV, No. 9.

From Lewis S. Atter, Rensselaer, Indiana:

Proceedings of the Association of County Surveyors and Civil Engineers of the State of Indiana, at its Fifth Annual Meeting, held in Indianapolis, January 20-21, 1885, together with Constitution, By-Laws, and other valuable matter.

From Benjamin Baker, Westminster, S. W., London, England:
Address of the President of the Mechanical Science Section of the British Association for the Advancement of Science, Aberdeen, 1885.

From Spencer F. Baird, Secretary Smithsonian Institution, Washington, D. C.:

Annual Report of the Board of Regents of the Smithsonian Institution, showing the operations, expenditures, and condition of the Institution for the year 1883.

A Catalogue of Scientific and Technical Periodicals, 1865-82, together with Chronological Tables and a Library Check List. Henry Carrington, Bolton.

From R. M. Bancroft, Upper Holloway, London, England:

A Practical Treatise on the Construction of Tall Chimney Shafts, containing Details of upwards of Eighty Existing Mill, Engine-House, Brick-Work, Cement-Work, and other Chimneys, in Brick, Stone, Iron and Concrete. Robert M. Bancroft and Francis J. Bancroft

From W. S. Barbour, Cambridgeport, Mass.:

The Mayor's Address at the Organization of the City Government, January 5, 1885, and the Annual Reports made to the City Council for the year 1884.

Annual Report of the City Engineer to the City Council for the year ending November 30, 1884.

The Twentieth Annual Report of the Cambridge Water Board to the City Council, together with the Reports of the Registrar and Superintendent, and other Documents for the year 1884.

From Max J. Becker, Columbus, Ohio:
Paper on Why do Rail Joints and Splice Bars Break? Read before the Engineers' Society of Western Pennsylvania, January 20, 1885.

From Henry A. Bentley, Newport, R. I.:
Report and Estimates for the Completion of the Sewage System of the City of Newport, R. I.

From G. H. Benzenberg, Milwaukee, Wisconsin:

Annual Report of the Board of Public Works of the City of Milwaukee, Wis., for the year 1884.

From the Board of Water Commissioners of Minneapolis, Minn.:
Annual Report of the Board of Water Commissioners of the City of Minneapolis, for the year ending March 1, 1885.

From John Bogart, New York City:
Beton Colignet and Goodridge System of Constructing and Repairing Railway and other Structures.

Will the Washington Monument Stand? Article taken from the *Engineering News*, March 14 and 15, 1885.

From Boston Society of Civil Engineers, Boston, Mass.:
Constitution and By-Laws and List of Members. February, 1885.

From Aug. J. Bowie, Jr., San Francisco, Cal.:
Transactions of the Technical Society of the Pacific Coast. Vol. I. June, 1884.

From Bureau of Education, Washington, D. C.:
Circular of Information of the Bureau of Education, No. 7, 1884; and Nos. 1 and 2, 1885; also pamphlet on Planting Trees in School Grounds, and the Celebration of Arbor Day.

From Bureau of Navigation, Navy Department, Washington, D. C.:
Telegraphic Determination of Longitude in Mexico and Central America, and on the West Coast of South America. Lieutenant-Commander Charles Henry Davis, and Lieutenants John Alexander Norris and Charles Laird, U. S. N.

From F. J. R. Carnella, Glau Mer Terrace, Swansea:
A Lecture on the Steel Age, delivered at the Royal Institution of South Wales, Swansea, February 11, 1884.

From Col. Thomas L. Casey, Corps of Engineers, U. S. A., Washington, D. C.:

Reports upon the Washington Monument.

From Messrs. B. S. Church and A. Fteley, New York City:
The following documents relating to the New Croton Aqueduct:

- (1.) Contracts and Specifications Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10 B and 11 A.
- (2.) Contract Drawings No. 1 Croton Gate-House, etc.
- (3.) Album of Maps, Drawings, Profiles and Details of Construction.

From George H. Cook, State Geologist, New Brunswick, N. J.:
Six Maps of the Geological Survey of New Jersey.

From Theodore Cooper, New York City:
General Specifications for Wrought-Iron Highways, Bridges and Viaducts. Theodore Cooper.

From E. L. Corthell, New York City:
The Tehuantepec Ship Railway. An Address delivered before the American Association for the Advancement of Science at its Thirty-fourth Meeting, Ann Arbor, Mich., August 26th, 1885.

From Martin Coryell, Lambertville, N. J.:
Eighth Annual Report of the Lambertville

- Water Company, Lambertville, March 13th, 1885.
- From J. J. R. Croes, New York City:
Statistical Tables of American Water-works for 1885. J. James R. Croes.
- From J. H. Decker, Secretary American Water-works Association, Hannibal, Mo.:
Report of Proceedings of the Fifth Annual Meeting of the American Water-works Association, held at Boston, Mass., April 21st, 22d and 23d, 1885.
- From Pat. Doyle, Black Town, Madras, India:
The "Chin Chic" or Chinese Chain Pump in the Lamb Tin Mines. Pat. Doyle, C. E. (2 copies).
Paper-Making in India, being notes of a visit to the Lucknow Paper Mills. Pat. Doyle, C. E.
- From A. Ebert, New York City:
Transactions of the American Yacht Club, 1885, containing article on Improvements in Naval Architecture. Capt. C. G. Lundborg.
- From C. H. Edwards, Quincy, Mass.:
Four Photographs of a New Stone Dumping Scow used at Newburyport Jetties, Mass.
- From N. H. Egleston, Forestry Division, Agricultural Department, Washington, D. C.:
Report upon Forestry, Vols. 1 and 2, 1877, 1878, 1879, F. B. Hough. Vol. 4, 1884. N. H. Egleston.
- Trees and Tree Planting, with Exercises and Directions for the Celebration of Arbor Day. Prepared by John B. Peaslee, Superintendent Cincinnati Public Schools, with preface by Warren Higley.
- Proceedings of a Convention of Delegates from Agricultural Colleges and Experiment Stations, held at the Department of Agriculture, July 8th and 9th, 1885.
- From Hon. S. B. Elkins, New York City:
An Address on the Industrial Question in the United States, delivered before the Alumni Association of the University of the State of Missouri.
- From Walton W. Evans, New Rochelle, N. Y.:
A Chapter in the History of the Queen's Cup, won by the yacht America in 1851.
- From Albert Fink, New York City:
Testimony of Albert Fink before the Select Committee on Inter-State Commerce of the United States Senate, New York, May 21st, 1885.
- From S. B. Fisher, Pittsburgh, Penn.:
Table of cubic yards in lengths of 100 feet.
- From P. J. Flynn, East Oakland, Cal.:
Hydraulic Tables based on the Formule of D'Arcy and Kutter. P. J. Flynn, C. E.
Shrinkage of Earthwork. P. J. Flynn, C. E.
- From Franklin Institute, Dr. William H. Wahl, Secretary, Philadelphia, Penn.:
Report of Examiners of Section X, Steam Boilers.
General Report of the Chairman of the Committee on Exhibition.
Report of Examiners of Sections XIV-XVI, Batteries; also Section XXX, Machinery and Mechanical Appliances.
- Report of Examiners of Section XXIV, Electro-Dental Apparatus.
Report of a Special Committee to determine the Efficiency and Duration of Incandescent Electric Lamps.
- From Alphonse Fteley, New York City:
Article on the New Croton Aqueduct, published in the June, 1885, number of *Science*.
- From C. C. Gilman, New York City:
Plans and Estimates of Gilman's Electrical Subway, submitted to the New York State Electrical Commission, August 26th, 1885.
- From Robert Gordon, London, England:
Proceedings of the Royal Geographical Society, May, 1885, containing article on The Irawaddy River.
- From Geo. S. Greene, Jr., Engineer in Chief Department of Docks, New York City:
Fourteenth Annual Report of the Department of Docks, for the year ending April 30th, 1884.
- Report on the Forests of North America, exclusive of Mexico, Charles S. Sargent, with Sixteen Maps, accompanying Report on Forest Trees of North America.
- From Guido Hauck, Rektor Königliche Technische Hochschule, Berlin, Prussia:
Die Grenzen Zwischen Malerei und Plastik und die Gesetze des Reliefs. Rede am Geburtstage Seiner Majestät des Kaisers und Königs, Berlin am 20. März, 1885. Gehalten von dem Zeitigen Rector Guido Hauck.
- From Gen. W. B. Hazen, Chief Signal Officer, U. S. A., Washington:
Professional Papers of the Signal Service, No. XVI.
Tornado Studies for 1884.
- From John T. Henthorn, Providence, R. I.:
On the Power Required to Overcome the Frictional Resistances of Engine and Shafting in Mills, and its Cost.
- From Clemens Herschel, Holyoke, Mass.:
The July number of the *Manufacturer*, containing Report of Wheel Tests made at Holyoke, Mass., by the Holyoke Water Power Company.
- From Albert B. Hill, New Haven, Conn.:
Annual Reports of the Department of the Board of Public Works, City of New Haven, Conn., for the year 1884.
- From William A. Ingham, Secretary Board of Commissioners Second Geological Survey of Pennsylvania:
Grand Atlas. Div. III, Part I.
- From Institution of Civil Engineers, James Forest, Secretary, London:
Notes on Electric Blasting in China. Claude William Kinder.
- Heat Action of Explosives. Capt. Andrew Noble.
- Further Data on Aerial Navigation. William Pole.
- Water Supply. William Pole.
- On Compressed Air and other Refrigerating Machinery. A. C. Kirk.

- Comparative Study of Various Methods of Traction Applicable to Railways. Marcel Deprez and Muirae Leblanc.
- On the Blasting and Removal of Rock under Water, and the Construction of a Deep-Water Quay, at Blyth Harbor. William Kidd.
- Description of Steel Permanent Way, as used on the London and North Western Railway. Francis William Webb.
- The Metropolitan and Metropolitan District Railways. Benjamin Baker.
- The City Lines and Extensions (Inner Circle completion) of the Metropolitan and District Railways. John Wolfe Barry. With an abstract of the discussion upon the paper.
- Abstract of Papers in Foreign Transactions and Periodicals.
- The Art of Making Paper by the Machine, as exemplified in the Manufacture of High-class Writings and Printings. James William Wyatt.
- The Barmouth Water-works. Thos. Roberts. The General Theory of Thermo-Dynamics. Prof. Osborne Reynolds.
- Notes on Compressed Air and Machinery for Utilizing it. John Kraft.
- Electric Lighting for Steamships. Andrew Jamieson. With an abstract of the discussion upon the paper.
- On Hauling Out and Launching Vessels Sideways. Murray Jackson.
- Pumping Machinery for Draining a Portion of the Marshes near Fondi, Southern Italy. Thomas Richard Guppy.
- Removal of Buddonness Light-house near Dundee Harbor. David Cunningham.
- The Burnham Sewage Outfall Works. Alfred Barton Brady.
- A Comparison of British and Metric Measures for Engineering Purposes. Arthur Hamilton Smythe.
- Secondary Batteries. Frank Geere Howard.
- Trigonometrical Surveying. Harley H. Dalrymple Hay.
- Discharge from Catchment Areas. James Craig.
- Method of Removing Rock under Water. Charles James.
- Guns Considered as Thermo-dynamic Machines. James Atkinson Longridge.
- The Gauging of Flowing Water. Henry T. Turner.
- Cost of Dredging at Calais and at Boulogne. F. Guillaum.
- Experiments on the Friction of Disks Rotated in Fluid. Prof. William C. Unwin.
- Brauer's Dynamo-metric Brake. H. Walther Meunier.
- Standard Engine Shed of the London and North Western Railway Company. Francis W. Webb.
- The Modern Practice in the Construction of Steam Boilers. David S. Smart.
- The Electrical Regulation of the Speed of Steam Engines and other Motors for Driving Dynamos. Peter William Williams. With an abstract of the discussion upon the paper.
- The River Buffalo. William Bloomfield Tripp.
- The Public Works of the Orange Free State, South Africa. Gustave Hallé.
- The Cape Government Railways. William George Brongner.
- The Pollution of the River Thames near London. Effect of the Drought of 1884. Robert William Peregrin Birch.
- The Purification of Water by Means of Iron on the Large Scale. William Anderson.
- The Purification of Water by Metallic Iron in Mr. Anderson's Revolving Purifiers. George Henry Ogston.
- Gas and Caloric Engines. Prof. Fleming Jenkins, LL.D.
- Mechanical Integrators. Prof. Henry Selby Hele Shaw. With an abstract of the discussion upon the paper.
- Water Motors. Prof. W. C. Unwin.
- Physiography. John Evans.
- Address of Sir Fred'k J. Bramwell, President, 13th January, 1885.
- The Tekapo Bridge, Mackenzie County, New Zealand. Frederic William Marchant.
- The Working of Tramways by Steam. Hon. Richard Clero Parsons.
- The Sydney Steam Tramways. Walter Shell-shear. With an abstract of the discussion upon the paper.
- Minutes of Proceedings. Vol. LXXIX. 1884-85, Part I.
- Minutes of Proceedings. Vol. LXXX. 1884-85, Part II.
- Charter, By-Laws and List of Members for June 3d, 1885.
- From Institution of Mechanical Engineers, Alfred Bache, London: Proceedings. March, 1885.
- From Iron and Steel Institute, J. S. Jeans, Secretary, London: The Journal of the Institute, No. 1, 1885.
- From William Jackson, City Engineer, Boston: Main Drainage Works of the City of Boston, Mass. Eliot C. Clarke. Boston, 1885.
- Eighteenth Annual Report of the City Engineer of Boston for the year 1884.
- From Wm. H. Jennings, Columbus, Ohio: The Ohio Mining Journal. Vol. III. May 15, 1885. Containing Article on Exhaustive Mining.
- From H. Kato, President of the Tokio Daigaha, Tokio, Japan: A System of Iron Railroad Bridges for Japan. Text, Tables and Plates. J. A. L. Waddell. 2 copies of each.
- From Edward H. Keating, Halifax, N. S.: Map showing Proposed Short Line Railway between Montreal and Halifax; also Report on the Proposed Short Line Railway connecting the Canadian Pacific Railway at Montreal with principal Atlantic Ports of the Dominion of Canada, and Letter on the Short Line Railway Question. By E. H. Keating.
- From John Kennedy, Montreal, Canada: Annual Report of the Harbor Commissioners of Montreal for the year 1884.
- From W. B. Knight, Kansas City, Mo.: Report of the City Engineer of City of Kansas, Mo., for calendar year of 1884.
- From Capt. Smith S. Leach, Memphis, Tenn.: Report of the Mississippi River Commission for 1884.
- From J. Francis Le Baron, Jacksonville, Florida.

Article on the St. John's Jetties. Capt. Leo Vogel.

Pamphlet showing the Statistics, Resources, Lands, Products, Climate and Population of Duval County, Florida, with a correct map.

Map of Brevard County, Florida.

The Atlantic and Gulf Coast Canal and Okeechobee Land Company. 2 copies.

Palma Sola, the youngest and largest town in Florida.

From C. P. Leland, Auditor Lake Shore Ry., Cleveland, Ohio:

Eleventh, Twelfth, Thirteenth and Fourteenth Annual Reports of the Board of Directors of the Lake Shore and Michigan Southern Railway Company.

From Louis Lesage, Montreal, Canada: Annual Report of the Superintendent of the Montreal Water-works for the year ending 31st of January, 1873, 1874, and December, 1882 and 1884.

From Light-house Board, Washington, D. C.:

List of Beacons, Buoys, Stakes and other Day-marks in the Fifth Light-house District.

From Liverpool Engineering Society, Thos. L. Miller, Secretary, Liverpool, England:

Transactions. Volumes I to V inclusive.

From A. Luders Light, Chief Engineer Government Railways, Province Quebec, Canada:

Reports upon the Survey of the Northern or Quebec Route for the shortest and most advantageous Railway Line from Montreal to Halifax and St. John, N. B., recommending a Combination Line.

Proposed Bridge over the St. Lawrence at Quebec, Canada.

From Arthur Macy, Silver King, Arizona:

The Resources of Arizona. Third Edition. Patrick Hamilton.

From Charles C. Martin, Brooklyn, N. Y.:

Acts of the State of New York and of the United States in relation to the New York and Brooklyn Bridge.

From the Mining Institute of Scotland. James Barrowman, Secretary, Hamilton:

Transactions. Vol. VII, 1885. Parts I and II. Rules; List of Members, 1884-85; and Catalogue of Library.

From Mississippi River Commission, Lieut. S. S. Leach, Corps of Engineers, U. S. A., Secretary, St. Louis:

A set of Charts of the Mississippi River, from the Mouth of the Ohio River to the Head of the Passes.

From New England Meteorological Society:

Bulletin for April, May, June, July, August and September, 1885.

From Prof. Simon Newcomb, Supt. The American Ephemeris and Nautical Almanac, Washington, D. C.:

Reports of Observations of the Total Eclipse of the Sun, August 7, 1869, made by parties under the General Direction of Prof. J. H. C. Coffin, U. S. N.

The American Ephemeris and Nautical Almanac for the year 1888. First Edition.

From Gen. John Newton, Chief of Engineers, U. S. A., Washington, D. C.: Annual Report of the Chief of Engineers, U. S. A., for 1884. Parts I, II, III and IV.

A Communication from the Secretary of War, and papers relative to the completion of the Monument at Yorktown. Lieut.-Col. Wm. F. Craighill.

A Letter from the Chief of Engineers, inclosing Map of Survey and Report upon the work of deepening Gedney's Channel through Sandy Hook Bar, New York; also inclosing a Report from the Board for Fortifications upon a plan for the permanent improvement of the entrance to New York Harbor. Major G. L. Gillespie.

Report relating to Newport Harbor, Rhode Island, and Fort Greene. Lieut.-Col. George H. Elliot.

Report, with an estimate of the cost for an improvement of Cypress Bayou and the Lakes between Jefferson and Shreveport. Capt. Eric Bergland.

Report as to the cost of the proposed improvement of the Harbor of Providence, R. I. Lieut.-Col. George H. Elliot.

Report of a Survey and Preliminary Examination of Wood Island Harbor, Maine. Col. C. E. Blunt.

Report of a Preliminary Examination of Bayou Bartholomew, Arkansas. Capt. Eric Bergland.

Report of Survey and Preliminary Examination of Scajacuada Creek, at Buffalo, N. Y. Capt. Edward Maguire.

An Estimate from the Secretary of War for the Construction of a Sea-wall around David's Island, New York Harbor.

Report of a Survey of Lake Champlain, at Four Channels, New York. Lieut.-Col. H. M. Robert.

Report of a Survey of Clinton River, Michigan. Lieut.-Col. O. M. Poe.

Report upon the condition of Green and Barren Rivers, Kentucky. Capt. James C. Post.

Report of Survey and Examination of Outer and Inner Bars, Pensacola Harbor. Capt. R. L. Hoxie.

Report of Survey and Examination of Sny Island Levee, Mississippi River. Major A. Mackenzie.

Report of the results of a survey of the Mouth of Scioto River, Ohio. Lieut.-Col. William E. Merrill.

Report of a survey and examination of York Harbor, Maine. Col. C. E. Blunt.

Report on the subject of a New Lock at Saint Mary's Falls Canal, in Michigan.

Report of survey and examination of the Bar in the Ohio River opposite the Mouth of Licking River. Lieut.-Col. William E. Merrill.

Report of the results of the survey of the Congaree River. Capt. W. H. Bixby.

Report of a survey of Bogue Sound, between New River and Beaufort, N. C. Capt. W. H. Bixby.

Report of a survey at Darien Harbor, Georgia. Gen. Q. A. Gillmore.

Report of a survey of Napa River, California. Lieut.-Col. G. H. Mendell.

Report of survey of Cashie River, from its mouth to Windsor, N. C. Capt. F. A. Hinman.

- Advertisement, Specifications and Proposals for Furnishing Brush and Poles on Board Government Barges in the Mississippi River, between St. Paul and Hastings, Minn.
- Constructing Six Flat-Boats for Use in the Improvement of the Upper Mississippi River.
- Furnishing Rip-Rap on Bank of the Mississippi River, between Rock Island, Illinois, and Montrose, Iowa.
- Furnishing Rip-Rap on Board Government Barges, in the Mississippi River, between Reed's Landing and Winona, Minn.
- Furnishing Rip-Rap on Bank of the Mississippi River, between Lansing and Dubuque, Iowa.
- For Constructing the Hull of a Steel and Iron Snag-Boat.
- Constructing Six Dump-Boats for Use in the Improvement of the Upper Mississippi River.
- For Improving Ice Harbor at Belle River, Michigan.
- For Dredging in Mississippi River at St. Paul, Minn.
- Improving Hay Lake Channel, Saint Mary's River, Mich.
- Improving the Harbor at Norwalk, Connecticut.
- Improving the Harbor at New London, Connecticut.
- Improving the Harbor at Bridgeport, Connecticut.
- For Dredging and Embankment for the Improvement of Potomac River.
- For Building Quarter-Boat and Scows for the Improvement of the Missouri River.
- For Building Dredge-Boat Hull and Cabin for the Improvement of the Missouri River.
- Improving Pamlico and Tar Rivers, N. C., and North Landing River, Virginia and North Carolina.
- Improvement of Rappahannock River, Va.
- For Iron-work of Navigation Pass of Dam No. 6, Great Kanawha River, W. Va.
- Constructing a Breakwater at Black Rock Harbor, Connecticut.
- Improvement of Wilmington Harbor, California.
- For Rip-Rap Stone for the Improvement of Potomac River, near Washington, D. C.
- Improvement of Harbor of Refuge at Portage Lake, Mich.
- Improvement of Grand River, Mich.
- For Dredging of Tidal Reservoir and Virginia Channel, Potomac River near Washington, D. C.
- General Instructions and Specifications for Bidders for Supplies and Materials.
- Schedule of Supplies and Materials.
- Removal of Wreck at Entrance to New Haven Harbor, Connecticut.
- Improving Harbor at Ashtabula, Ohio.
- Construction of Fishways at the Great Falls of the Potomac.
- Kentucky River Improvement, Dam No. 4.
- Little Kanawha River Improvement, Lock No. 5.
- Improving Harbor at Green Bay, Wisconsin.
- Improving Maurice River, N. J.
- Improving Hay Lake Channel, Saint Mary's River, Michigan.
- Improvement of Big Sandy River, West Virginia and Kentucky.
- Improvement of Little Kanawha River, W. Va.
- Dredging at St. Clair Flats Canal, Michigan.
- Constructing Crib-Pier or Breakwater in the Harbor of Stockholm, Upper Mississippi River.
- For Extension of Engineer Wharf at Willett's Point, New York Harbor.
- Lock No. 1, Kentucky River Improvement.
- Iron-work for 15-inch Gun Platforms at Forts Foote and Washington, Md.
- For Supplies and Materials.
- Irons for Lock No. 2, Great Kanawha River Improvement.
- Iron-work for Barbette Gun Platforms for Heavy Guns at Fort Adams and Fort at Dutch Island, R. I.
- Laying the Iron-work for Platforms for Heavy Guns at Fort Adams and Fort at Dutch Island, R. I.
- Proposals for Harbor Improvement.
- Proposals for Dredging.
- Construction of Breakwater at Rouse's Point, Lake Champlain, N. Y.
- Improvement of Delaware River. Dredging at Mifflin Bar.
- Dredging west of Petty's Island.
- Construction Dike near Mifflin Bar.
- Construction Dike between Fisher's Point and Petty's Island.
- Repairs of Gun Platforms at Fort Montgomery, N. Y.
- Furnishing Rip-Rap on board Government Barges in the Missouri River.
- For the Engines and Machinery of a Steel and Iron Snag-boat.
- Rip-Rap on board Government Barges in the Missouri River.
- Rock Excavation. Falls of the Ohio River, at Louisville, Kentucky.
- For Repair of Buffalo Breakwater, opened at United States Engineer's office, Oswego, N. Y., July 30th, 1885.
- Improving Approach to Norfolk Harbor and the United States Norfolk Navy Yard, Virginia.
- Improving Broadkill River, Delaware.
- Maneuvering Boat for Davis' Island Dam.
- Dredging Moose-a-bec Bar, Maine.
- Dredging in Bangor Harbor, Maine.
- Preliminary Report of the Committee on Transportation Routes to the Seaboard.
- Report relative to the Expenditures for Rivers and Harbors.
- A set of detail drawings and twelve views of the St. Mary's Falls Canal and Locks, Michigan.
- From New York Meteorological Observatory. Dr. Daniel Draper, Director, Central Park, New York City:
- Abstracts of Registers from Self-Recording Instruments, December, 1884; also for the year ending December 31st, 1884; also January, February, March, April, May, June, July and August, 1885.
- From New York State Board of Health, Albany, N. Y.:
- Monthly Bulletin, February to August, inclusive.
- From Wm. Ripley Nichols, Boston, Mass.:
- Contributions to our Knowledge of Sewage. Wm. Ripley Nichols.
- From Hon. Joseph Nimmo, Jr., Chief of Bureau of Statistics, Washington, D. C.:
- Report on the Internal Commerce of the United States for 1884.

From Edward P. North, New York City: Testimony of Egbert L. Viele in the Matter of the Petition of the New York Cable Railway Company. Also Testimony of E. Ogden Doremus in the same case.

The Proceedings of the Meeting of the Executive Committee of the Western Waterways, held at Willard's Hotel, Washington, D. C., January 13th, 14th, 1885.

From the North of England Institute of Mining and Mechanical Engineers. Theo. Wood Bunning, Secretary, Newcastle-on-Tyne: Transactions, Vol. LXXXIV, 1885. Part II. An account of the Strata of Northumberland and Durham, as proved by Borings and Sinkings.

From Richard B. Osborne, Philadelphia: Select Plans of Engineering Structures for Railroads and Highways.

From Charles Paine, Cleveland, Ohio: Fifteenth Annual Report of the Lake Shore and Michigan Southern Railway Company for the fiscal year ending December 31st, 1884.

From M. S. Perisse, Paris, France: Le Bronze Conference faite le 22 Mars, 1885, au Conservation Natural des Arts et Metiers.

From Peter A. Peterson, Montreal, Canada: Five Photographs of Bridges on the Canadian Pacific Railroad.

From H. V. and H. W. Poor, New York City: Manual of the Railroads for 1885, Eighteenth Annual Number.

From M. E. Pontzen, Paris, France: Pile-Driving Improvement. La Seine Maritime, et son Estuain E. Lavoine Ingénieur en Chef des Ponts et Chaussées.

From Richard Potts, Chicago, Ill.: Ninth Annual Report of the Department of Public Works of the City of Chicago, Ill., for the fiscal year ending December, 1884.

From Hon. J. W. Powell, Director United States Geological Survey, Washington, D. C.: Bulletin of the United States Geological Survey, Nos. 2, 3, 4, 5 and 6.

From Franklin C. Prindle, Bloomfield, N. J.: Geological Survey of Newfoundland.

From Rensselaer Society of Engineers. Montgomery Waddell, Secretary, Troy, N. Y.: Transactions. Vol. I, No. 2.

From William E. Rogers, Railroad Commissioner, Albany, N. Y.: Second Annual Report of the Board of Railroad Commissioners of the State of New York for the fiscal year ending September 30th, 1884, Vol. II, January 12th, 1885.

From Andrew Rosewater, Omaha, Neb.: Annual Report of the City Engineer of the City of Omaha, Neb., April 1st, 1884, to April 1st, 1885.

Proceedings of the Nebraska Association of Engineers and Surveyors, held at Lincoln, March 26th and 27th, 1884, and January 13th and 14th, 1885.

From the Royal Technical High School of Hanover, Germany: Catalogue of Studies for the year 1885-86.

From James Ryan, Secretary Board of Water Commissioners, Buffalo, N. Y.: Sixteenth Annual Report of the Buffalo City Water-works, Buffalo, N. Y., for year 1884.

From D. C. Sanford, New Haven, Conn.: Proceedings of the First Annual Meeting of the Connecticut Association of Civil Engineers and Surveyors, held at New Haven, Conn., January 13, 1885.

From Collingwood Schreiber, Ottawa, Canada: Railway Statistics of Canada; and Capital, Traffic and Working Expenditure of the Railways of the Dominion for 1883-84; also Map showing the Railways of Canada, to accompany Annual Report on Railway Statistics, 1884.

From Second Geological Survey of Pennsylvania: Geological Atlas of Counties. Atlas of the Northern Anthracite Field. Part I. Perry County. Part I. Geology. Printed Map of the Oil Region of Western Pennsylvania and Southwestern New York, showing the general outlines of all producing areas discovered prior to July, 1884. Charles A. Ashburner, Asst. Geologist.

From Société des Ingenieurs Civils, Paris: Memoires, May, 1885.

From C. Spruntt, City Engineer, Toronto, Canada: Report of the City Engineer of Works—performed and expenditure for the same—for the year ending December 31st, 1884.

From Robert B. Stanton, Denver, Colorado: Report of the Committee on Building Stone of the State of Colorado, July 3d, 1884, embracing the Report and Tables of the Denver Society of Civil Engineers and of Prof. Regis Chauvenet. A Report by a Special Committee of the Colorado Scientific Society on the Artesian Wells of Denver.

Four Photographs taken at different points on the U. P. Ry., Denver, Col., as follows: The Loop between Georgetown and Silver Plain, Col.

Two different views of the Loop near Georgetown, Col.

The High Bridge in the Loop near Georgetown, Col.

From Simon Stevens, New York City: Letter to the Chamber of Commerce relative to the Water Front of the City of New York.

From Charles L. Stevenson, Salt Lake City, Utah: Application for a Water Supply made to the City Council of Salt Lake City, Utah.

From Julius H. Striedinger, New York City: Table of Tides at Port of Panama for the year 1885.

From Hon. E. Sweet, State Engineer, Albany, N. Y.: Report of the State Engineer on the Canals of New York for 1884; also Map of Erie and Champlain Canals, State of New York.

- From Lucian A. Taylor, Water Commissioner, Worcester, Mass.:
Annual Report of the Committee on Water, the Water Commissioner and Water Registrar of the City of Worcester for the year ending November 30th, 1884.
- From Robert H. Thurston, Hoboken, N. J.:
An Address of R. H. Thurston, delivered at the Philadelphia Meeting of the American Association of Science on September 5th, 1884.
- From John C. Trautwine, Jr., Philadelphia, Pa.:
The Civil Engineers' Pocket Book for 1885.
- From J. Nelson Tubbs, Rochester, N. Y.:
Fifth and Sixth Annual Report of the Executive Board of the City of Rochester, N. Y., for the year ending April 4th, 1881-82.
- Eighth Annual Report of the Executive Board of Rochester, N. Y., for the year ending April 7th, 1884.
- From United States Geological Survey, Washington, D. C.:
Silver Lead Deposits of Eureka, Nevada. Joseph S. Curtis.
Monographs of the U. S. Geological Survey. Vols. III and IV:
The Copper-Bearing Rocks of Lake Superior. Rowland Duer Irving.
Atlas to accompany the Geology of the Comstock Lode and the Washoe District.
- Third Annual Report of the United States Geological Survey to the Secretary of the Interior. 1881-82. J. W. Powell.
Contributions to the Knowledge of the Older Mesozoic Flora of Virginia.
- From Robert Van Buren, Brooklyn, N. Y.:
Annual Report of the Department of City Works made to the Common Council of the City of Brooklyn for the year 1884.
- From U. S. Naval Institute, Annapolis, Md.:
Proceedings. Vol. XI.
From B. Verohn, New York City:
Resultate aus den Theorie des Brückenbaus und deren Anwendung. Durch Beispiele erläutert von R. Krohn. II Abtheilung Bogenbrücken. Vols. I and II.
- From Leveson Francis Vernon-Harcourt, London:
Harbors and Docks, their Physical Features, History, Construction, Equipment and Maintenance, with statistics as to their commercial development. L. F. Vernon-Harcourt. Oxford, 1885. Vol. I, Text. Vol. II, Plans.
- From Jos. Waltz, Dayton, Ohio:
Fifteenth Annual Report of the Trustees of the Dayton Water-works for the year ending December 31st, 1884.
- From Arthur M. Wellington, New York City:
The Car Builders' Dictionary for 1884.
- From Edmund B. Weston, Providence, R. I.:
Bulletin of the New England Meteorological Society, February, 1885.
- From Samuel Whinery, Somerset, Ky.:
Report of the Engineer and the Committees in regard to the Proposed Bridge over the Tennessee River at Chattanooga, also the Law Affecting the Building of Bridges.
- From F. Cope Whitehouse, New York City:
The Pyramid Hill of Gizeh. F. Cope Whitehouse.
- From John Whitelaw, Cleveland, Ohio:
Twenty-third to the Twenty-eighth Annual Reports, inclusive, of the Trustees of the Water-works of the City of Cleveland, Ohio.
- From Thomas J. Whitman, St. Louis, Mo.:
Report of the Board of Public Improvements on Proposed Extension of the St. Louis Water-works, St. Louis, July, 1885 (2 copies).
- From John Wiley & Sons, New York City:
A Manual of the Theory and Practice of Topographical Surveying by means of the Transit and Stadia, etc. J. B. Johnson, C.E.
- From Wilson Brothers & Co., Philadelphia:
Catalogues of Works Executed, Accompanied by Illustrations.
- From C. J. H. Woodbury, Boston:
A Paper on the Automatic Sprinklers for Protection against Fires. C. J. H. Woodbury.
- From Herrn Prof. Dr. Wüllner, Rector der technischen Hochschule, Aachen, Prussia:
Der Reibungswinkel. Gustav Herrmann.
Ueber Benzarsinsäuren und deren Derivati. Dr. W. La Coste.
Die Specifiche Wärme Flüssiger Organischer Verbindungen und ihre beziehung zu deren Moleculargewicht. M. A. Von Reils.
Die Einführung des ersten Rektors am 15 November, 1880, und die Übergabe des Rektorates am 2 Juli, 1883.
Programme der Königlichen Technischen Hochschule zu Aachen für das Studienjahr, 1884-85.
- From other Sources:
Report to the Stockholders of the Missouri Pacific Railway Company Leased and Operated Lines, and the Texas and Pacific Railway Company for the year 1884.
First Annual Report of the Commissioner of Navigation for the year 1884.
Report of the Secretary of War, Vol. III, 1883-84.
Annual Report of the Secretary of the American Iron and Steel Association, giving Statistics of the American and Foreign Iron Trades for 1884.
N. Y. Supreme Court. In the Matter of the Petition of the New York Cable Railway Company in regard to Points for the Petition First Powers of the Mayor's Commission.
Description of the Automatic and Water Regulating Flood-gate Patented in all Countries.
Report of the Commissioners of the State Reservation at Niagara.
The Fallacy of the Present Theory of Sound. Henry A. Mott, Jr.
Fourth Annual Report of the Chicago, St. Paul, Minneapolis and Omaha Railway Company for the year ending December 31, 1884.
Pamphlet on Architecture Simplified; or, How to Build a House.

Transportation Lines owned, leased and controlled by the Pennsylvania Railroad Company on the 1st day of January, 1885.
The Manual of Statistics, Vol. VI, July 5, 1885.

Abstracts of the Proceedings of the Society of Arts for the Twenty-third year 1884-85.
Reports on the Spring Valley Hydraulic Gold Mining Company, comprising the Cherokee,

Flat, Blue, Grand and Spring Valley Mining and Irrigating Company's Property.
Programm der Königlichen Technischen Hochschule zu Aachen für das Studienjahr, 1885-86.

Nouveau Procédé pour L'impregnation du Bois. M. E. Pontzen.
Neues Verfahren um Holz zu Imprägniren. M. E. Pontzen.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

Date of Election.

HEALD, SIMPSON CLARK.....	492 Main st., Worcester, Mass.	Nov. 4, 1885.
LATHAM, HARRY HUBBARD.....	180 Dearborn st., Chicago, Ill.	Dec. 2, 1885.
LEAVITT, FRANK McDOWELL.....	17 Adams st., Brooklyn, N. Y.	" " "
MACY, ARTHUR.....	(Elected Junior July 12, 1877), Superintendent Silver King Mining Company, Silver King, Arizona.....	" " "
MAXIM, HIRAM STEVENS.....	57 th Hatton Garden, London England.....	Oct. 7, 1885.
POU, ARTHUR.....	Chief Engineer Savannah, Dublin and Western Short Line R. R., Dublin, Ga.....	Dec. 2, 1885.
RICHARDSON, THOMAS FRANKLIN,	Division Engineer, Chicago, Burlington & Northern R. R., Clayton, Iowa.....	Nov. 4, 1885.

CHANGES AND CORRECTIONS.

MEMBERS.

BARNARD, AUGUSTUS P.....	37 West Ninth st., New York City.
BILLIN, CHARLES E.....	115 Dearborn st., room 63, Chicago, Ill.
BLAISDELL, ANTHONY H.....	U. S. Assistant Engineer Missouri River Commission, St. Louis, Mo.
BRIGGS, ROSWELL E.....	Fairhaven, Mass.
BRODHEAD, CALVIN E.....	Flemington, N. J.
BRYSON, ANDREW.....	Principal Assistant Engineer Kings Co. Elevated R'y, 26 Court st., Brooklyn, N. Y.
CARTWRIGHT, ROBERT.....	Stamford, Conn.
COLTON, OREN B.....	2009 Wallace st., Philadelphia, Pa.
CONSTABLE, CASIMIR.....	44 Exchange place, New York City.
ELLIOTT, GEORGE H.....	P. O. Box 217, Norfolk, Va.

ENGLE, ROBERT L.....	Assistant Chief Engineer Chicago, Burlington and Northern R. R., St. Paul, Minn.
GORDON, ROBERT.....	Rangoon, Burmah.
HOYT, WILLIAM E.....	Chief Engineer Buffalo, Rochester and Pittsburgh R. R., Rochester, N. Y.
HUNT, RANDELL.....	Engineer in charge Chippewa Bridge, Chicago, Burlington and Northern R. R., Wabasha, Minn.
MARR, GEORGE A.....	U. S. Engineer's Office, Rock Island, Ill.
MCCOLLOM, THOMAS C.....	Civil Engineer U. S. N., U. S. Navy Yard, New York.
McKEE, CHARLES H.....	(Care Rogers, Shanley & Farrell), High Bridge, N. Y.
METCALF, WILLIAM.....	136 First ave., Pittsburgh, Pa.
MILLER, REUBEN.....	136 First ave., Pittsburgh, Pa.
PAINE, WILLIAM H.....	Tenth Ave. Cable R. R., Tenth ave. and One Hundred and Twenty-eighth st., New York City.
PHINNEY, HENRY W. B.....	622 East One Hundred and Forty-first st., New York City.
POLK, GEORGE W.....	Assistant Land Commissioner Southern Pacific Co., Atlantic System, Houston, Texas.
ROSS, JAMES.....	Chief Engineer and Manager of Construction Mountain Division Canadian Pacific R'y. (General offices C. P. R. R.), Montreal, Canada.
SANDERSON, J. GARDNER.....	Sanderson ave., Scranton, Pa.
SAVAGE, ALBERT C.....	(Care J. W. Shipman), 59 Tribune Building, New York City.
SHAILER, ROBERT A.....	W. G. Coolidge & Co., 36 Montauk block, Chicago, Ill.
SMITH, HAMILTON, Jr.....	1 Pembridge Crescent, Notting Hill, W., London, England.
TEMPLE, ROBERT H.....	Chief Engineer, Memphis, Birmingham and Atlantic R'y, Memphis, Tenn.
TRUESDELL, CHARLES.....	Superintendent Homer and Cortland Gas Light Co., Cortland, N. Y.
VOORHEES, THEODORE.....	Assistant General Superintendent New York Central and Hudson River R. R., Grand Central Depot, New York City.
WILDER, FRANCIS M.....	Superintendent Corliss Steam Engine Co., Providence, R. I.

JUNIORS.

ABBOTT, ARTHUR V.....	35 Broadway, Room 100, New York City.
BLANC, FREDERICK N.....	(Care W. H. Gebhard), 21 Nassau st., New York City.

DARLINGTON, FRANK G.....	Superintendent Cincinnati and Muskingum Valley Division, Pittsburgh, Cincinnati and St. Louis R'y, Zanesville, Ohio.
GAY, MARTIN.....	107 West Forty-first st., New York City.
HAINES, CASPAR W.....	Second Assistant National Argentine Observatory, Cordoba, Argentine Republic.
STARR, CHANDLER D.....	134 Second ave., New York City.

RESIGNATIONS.

MEMBERS.

LEACH, SMITH S.....	December 31, 1885.
YARDLEY, EDMUND.....	" " "

ASSOCIATES.

WATKINS, CHARLES D.....	December 31, 1885.
-------------------------	--------------------

DEATH.

WALTON, LOUIS R.....	Elected Member April 1, 1885. Died November 9, 1885.
----------------------	--